# Coal Age

SEP 22 1944
DETROIT

SEPTEMBER, 1944

## IRON HORSE: BIG MARKET PROBLEM

# KEEPING LOADERS *on a 96-hour week*

## SOLNUS HYDRAULIC OILS

### Eliminate sludging . . . reduce cost of loader operation

Loader trouble is one thing that can, and often does, slow up production in any mine. But it's a trouble that can be kept down to a minimum by the use of the right hydraulic oil.

**Dissatisfaction with the performance** of a well-known brand of oil which they were using in the hydraulic system of a loader, caused one operator to look for something better. It was felt that downtime for cleaning and service was far higher than it should be.

**After consulting a Sun Engineer,** this oil was replaced with Solnus Hydraulic Oil. Eight months of service have proved the soundness of the Sun Engineer's suggestion. In that length of time, Solnus Oil formed no sludge, retained its body, and showed a worthwhile reduction in the amount of oil used.

**Solnus Oil kept the loaders running,** 2 shifts a day, 6 days a week . . . lowered costs and prevented trouble that had hampered production.

**In many other mines,** Sun Engineers and Sun Lubricants are helping equipment do a better job, longer. The new Sun lubrication manual, "How To Get The Most Out of Lubricants," will help you conserve machines, time and labor through proper lubrication practices. You can obtain a copy, without cost or obligation, by writing to . . .

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*In war or peace*
**B.F.Goodrich**
**FIRST IN RUBBER**

# Where flour dust is dynamite

*A typical example of B. F. Goodrich development in rubber*

FLOUR dust can be highly explosive. When anything that burns is broken into fine particles and mixed with the right amount of air, a single spark can cause an explosion.

Millers did everything possible to keep out of their plants anything that might cause sparks, but the greatest danger came from belts used to drive their machines. A running belt frequently built up static electricity. Because rubber wouldn't conduct electricity, the current would build up until the charge was strong enough to jump to some conductor — jump *and* spark.

Flour men were afraid of this danger and came to B. F. Goodrich for help. They found that B. F. Goodrich research men had already changed the very nature of rubber by developing a compound that *carries* electricity — the current flows through the rubber and is carried away. Belts made of this material — with *one billion times* the ability of ordinary rubber to carry electricity — have been protecting powder and chemical plants from explosions for several years. Static-conducting belts like those in the picture were installed in the flour mills and immediately ended threats of explosion.

There are many new B. F. Goodrich developments you may not know of that might solve a problem for you. And there have been many improvements in older products. For B. F. Goodrich research is continuous, on old products as well as new. If you have a problem that might be solved by rubber — natural or synthetic — write *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

**B.F. Goodrich**

**RUBBER** *and* **SYNTHETIC** *products*

# ONE THING....

## *done supremely well—*

The discovery of rays of an unknown nature, hence named "X-rays," by the great German physicist, Wilhelm Konrad Roentgen, while working with highly exhausted vacuum tubes in 1895, enabled medical men to look inside the human body and to diagnose and treat its hidden troubles.

When HULBURT of Philadelphia turned the X-ray of Research on lubrication troubles in Coal Mines, the result was one specialized product, made for one specific purpose, the proven REMEDY for lubrication troubles—HULBURT QUALITY GREASE.

# HULBURT *Quality* GREASE

**HULBURT OIL & GREASE CO.**

*Specialists in Coal Mine Lubrication*

PHILADELPHIA, PA.

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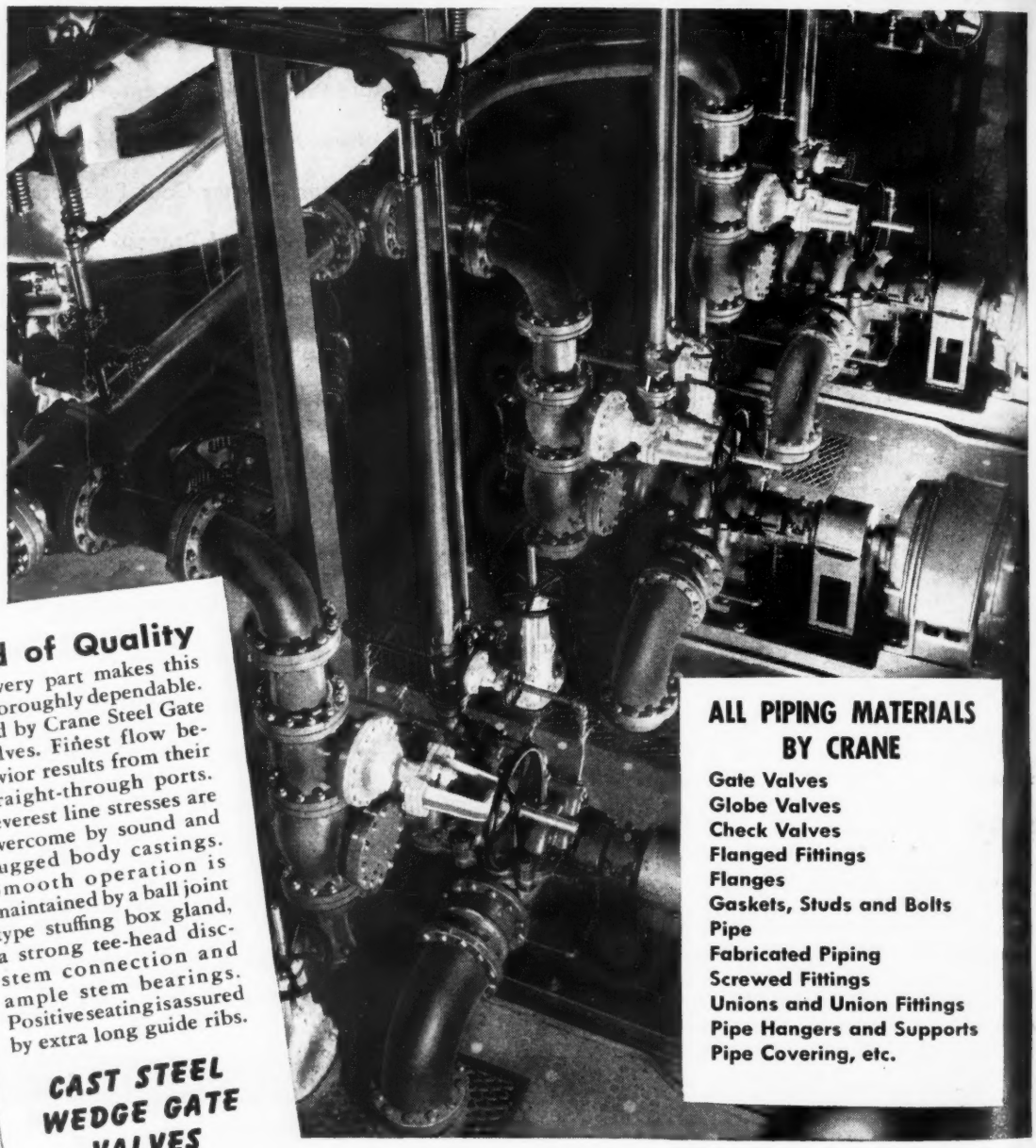

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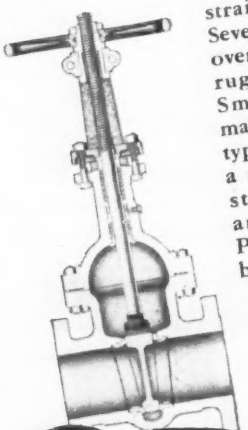

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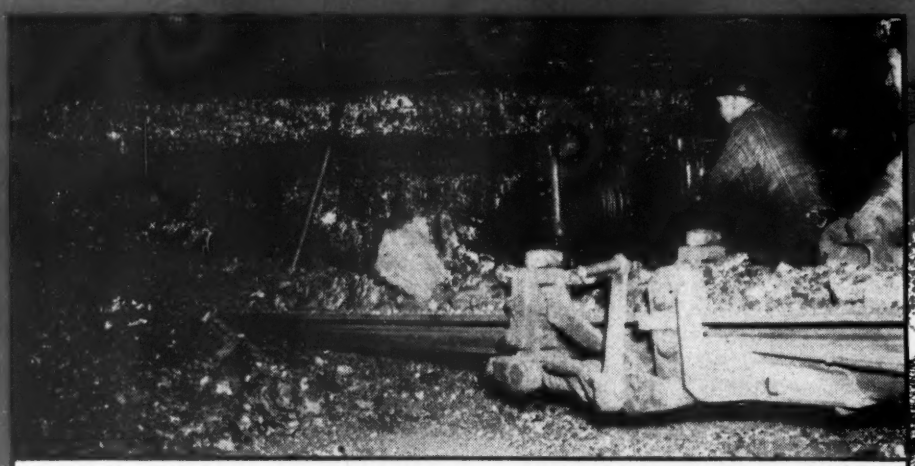
# *The* GOODMAN DUCKBILL-SHAKE *Simultaneous and Continuou*

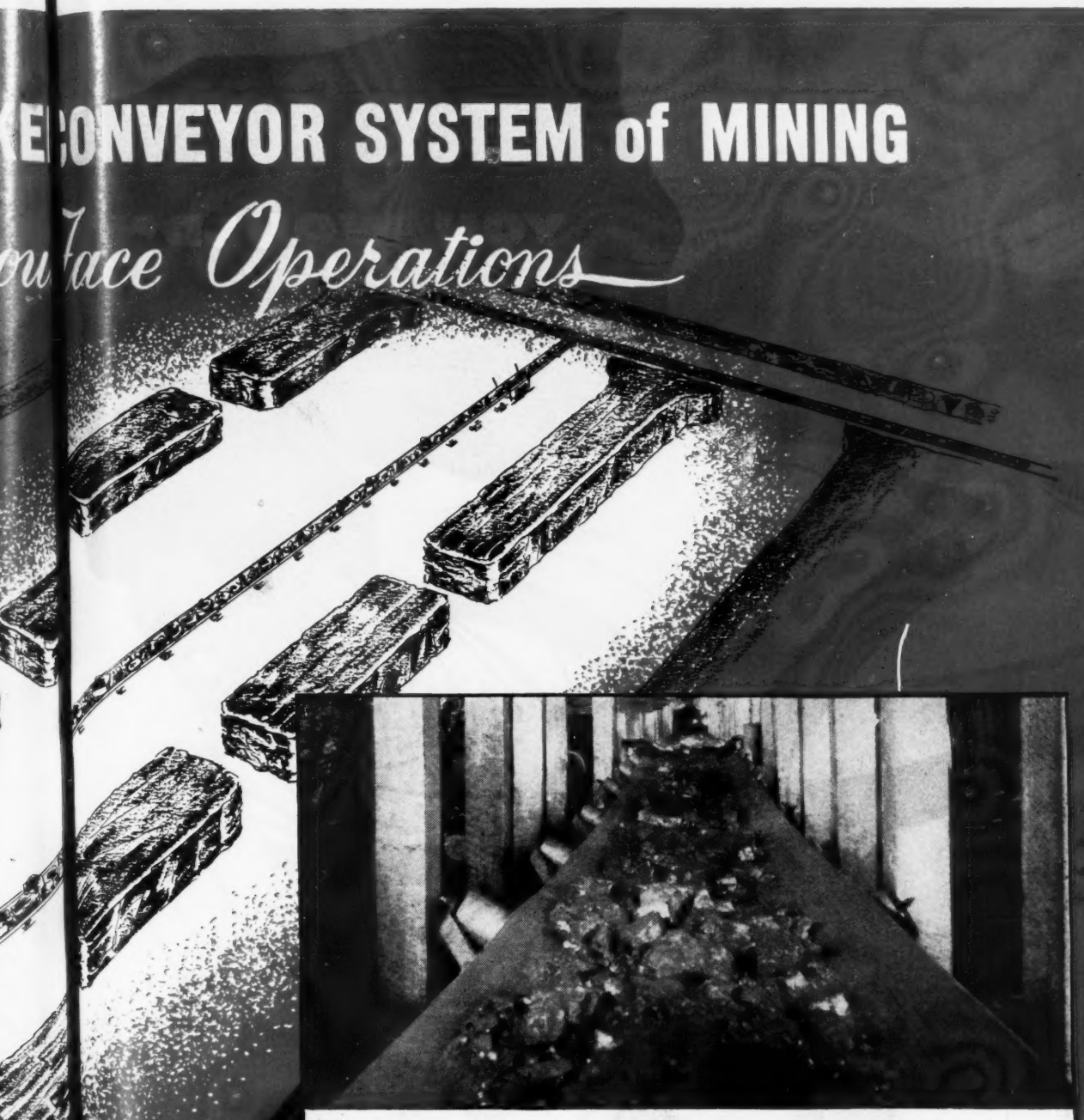


Duckbill loads out while cutting and drilling operations are carried on.

14837

# E CONVEYOR SYSTEM of MINING

## ou face Operations





Coal transported to room neck by shaker conveyor for delivery by belt to main entry.

ARMY E NAVY

GOODMAN MANUFACTURING COMPANY

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YOU WOULDN'T
J. Berger

# PUT A STRAIT JACKET ON AN *Acrobat*

## LAY·SET PREFORMED *is free.*

Of course, this analogy is far-fetched. Any aerial acrobat dressed in a strait jacket would probably break his neck. But it is still true that the wires and strands of non-preformed wire rope are virtually in a strait jacket—locked in position and under constant stress—with the result that the rope doesn't perform as well nor so long as Hazard **LAY-SET**, which is preformed at the mill and entirely relieved of stresses and strains. **LAY-SET** Preformed wire rope gives you greater dollar value because it requires no seizing when cut; it resists kinking and whipping; it is easier to splice, faster to reeve and safer to handle. Since it is endowed with high fatigue resistance, it wears longer.

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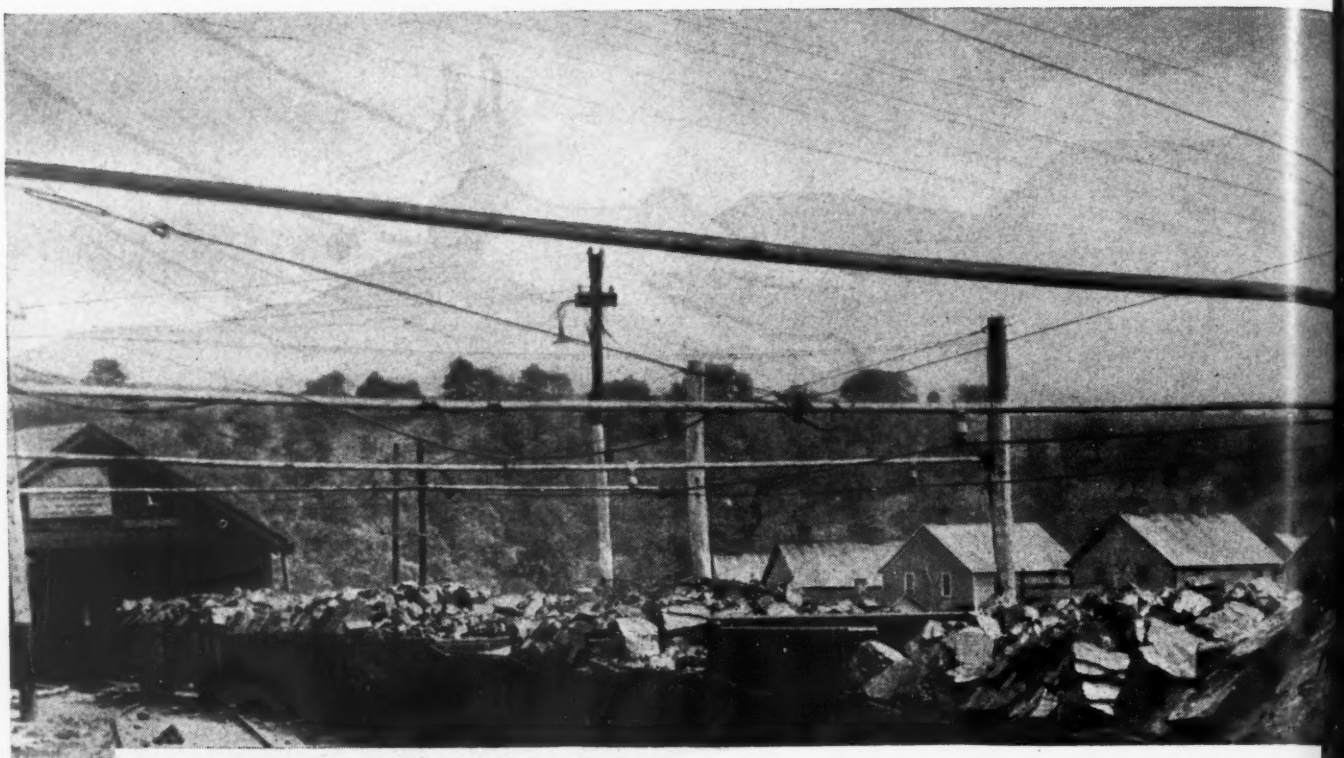
GREEN SIGNIFIES SAFETY

**HAZARD LAY·SET *Preformed* WIRE ROPE**



# BACKBONE OF WAR POWER

COAL supplies 55% of all U. S. mechanical energy . . . and wartime tonnage requirements put an unprecedented strain on mechanized mine equipment.

To increase production efficiency and extend the life of all types of coal mining machinery, operators everywhere depend on Texaco Maintenance Lubrication Charts and the proved effectiveness of Texaco lubricants.

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# TS for the Coal Mining Industry

# NO... Any Old Rope Won't Do

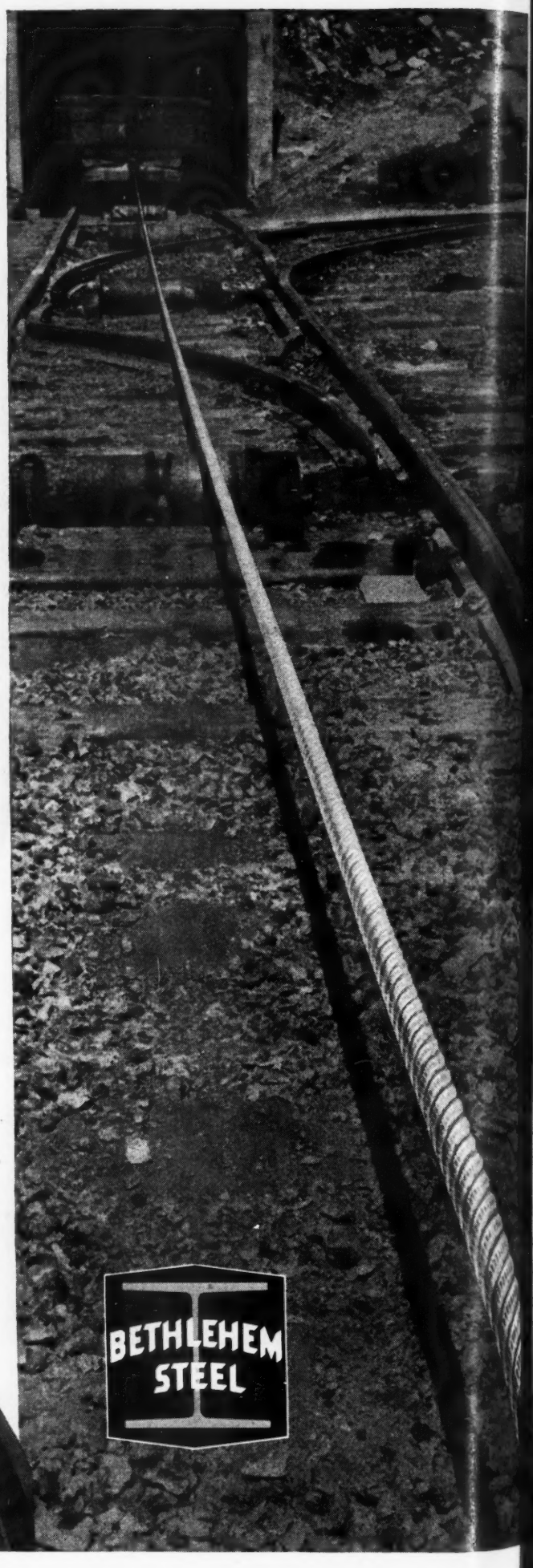
See that rope on your slope haulage? Unquestionably, it's one of the hardest workers around your mine. A worker whose job is monotonous, humdrum, unspectacular—but vitally important when you're feeding hungry tipples from a slope haulage system.

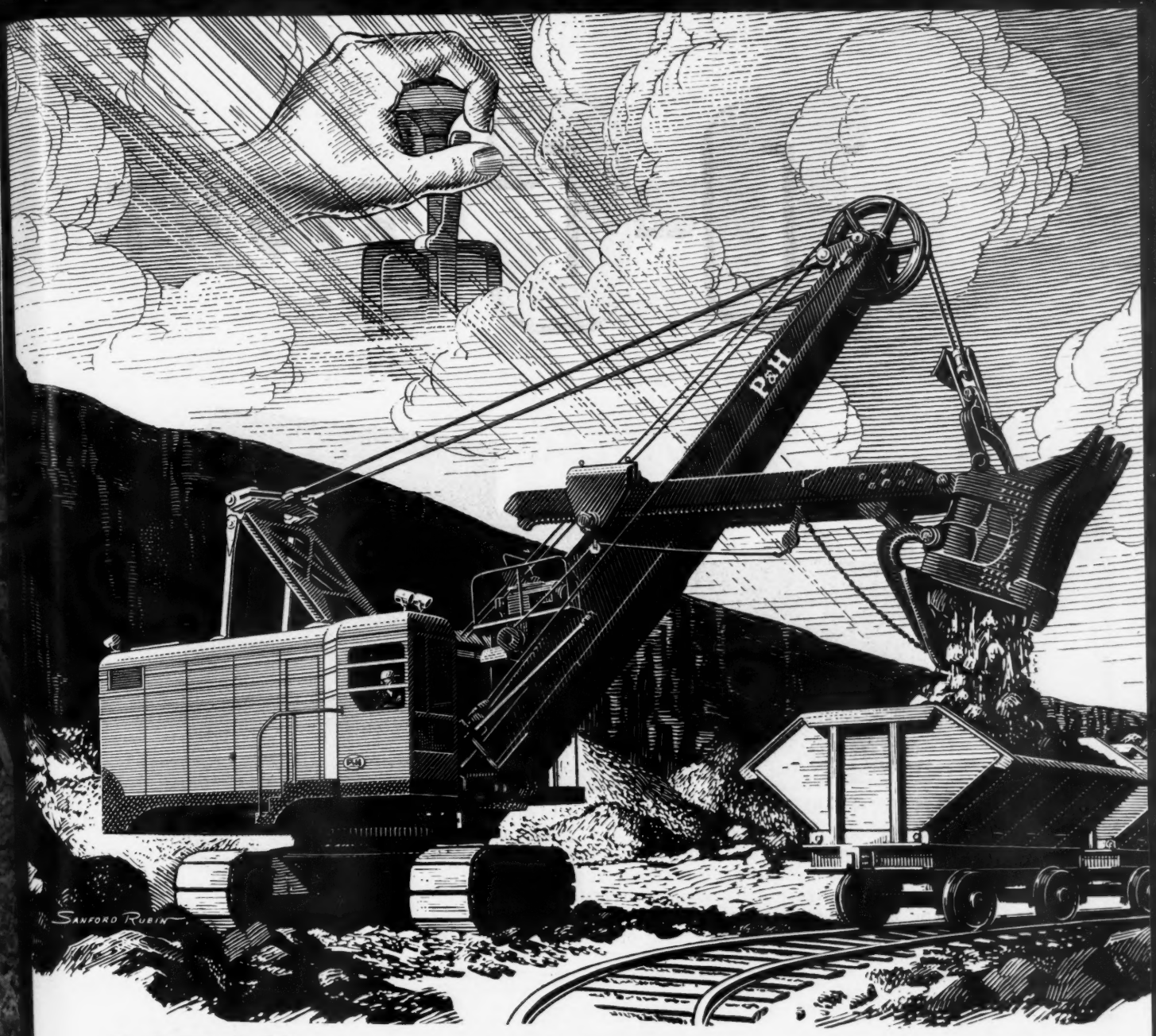
If it's Purple Strand rope in the system, it's your best assurance of dependable operation, day in and day out. Purple Strand is Bethlehem's highest-quality rope, and it's available in coarse constructions to withstand the slapping and abrasion that sometimes shorten the life of slope ropes. In these coarse constructions, Bethlehem can furnish a Purple Strand rope that will take an awful crown-wire beating.

This combination is important. It's one of those unseen factors that keep a slope rope from failing at a critical moment—just when you need it the most.

Why not call in a Bethlehem man the next time you figure on replacements? He's got a good product, and he knows what it will do on special applications like slope haulage jobs.

***when you think WIRE ROPE . . . think BETHLEHEM***






# *NEW!* P&H DIRECTRON CONTROL

## — the simplest, smoothest, most efficient control ever applied to an electric shovel

America's open pit mines and quarries have long felt the need for better electric shovel control — for the simplification of motor and motor generator design, and auxiliary control equipment with its complicated relays, resistors, and switchboard panels.

Through years of research and development—P&H has perfected the revolutionary new Directron Control. Simpler, more direct, more dependable, this control overcomes maintenance problems and adds years to the life of all electrical equipment. It also adds substantially to digging time.

In addition, Directron Control provides the quick, velvety response for steady production and levels out the power peaks to reduce power line charges to a minimum.

Another development in P&H's sixty-year experience of applying electrical power to the movement of heavy loads, it is but one of many outstanding advancements found in the new P&H Electric Shovels. Write for complete information.

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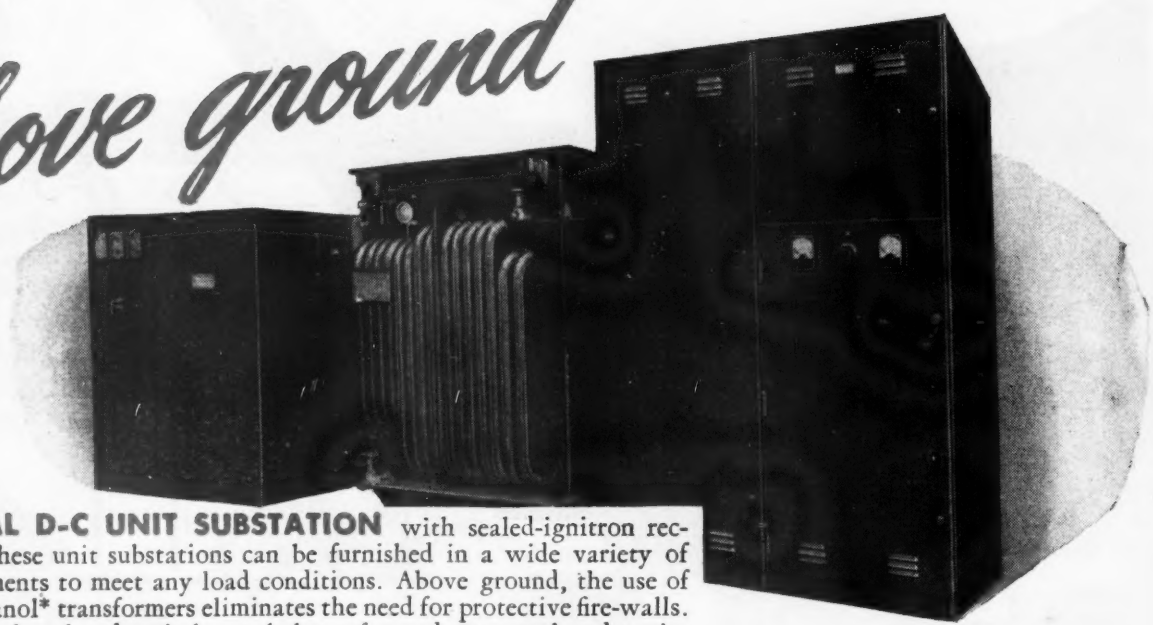
# D-C RIGHT

## *Above ground*



**TYPICAL D-C UNIT SUBSTATION** with sealed-ignitron rectifiers. These unit substations can be furnished in a wide variety of arrangements to meet any load conditions. Above ground, the use of G-E Pyranol* transformers eliminates the need for protective fire-walls. G-E metal-enclosed switchgear helps safeguard personnel and equipment, gives you ease of maintenance—the draw-out breakers have mechanical interlocks to prevent connecting or disconnecting them when in the closed position.

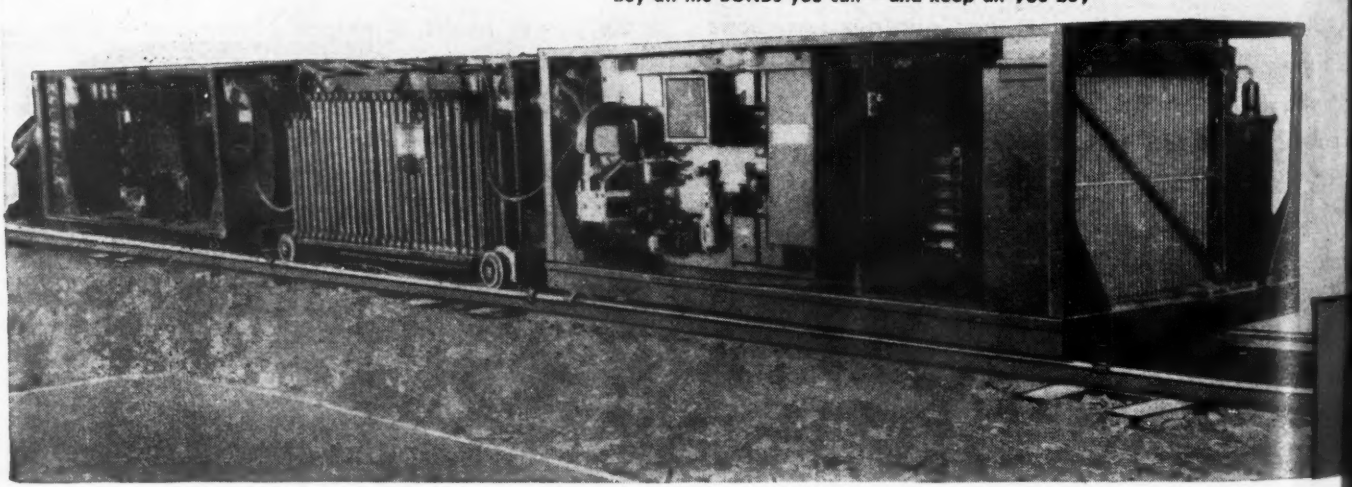
**Pyranol is General Electric's trade-mark for a synthetic cooling and insulating liquid that will not burn.*

## *or below*

**PORTABLE UNDERGROUND D-C SUBSTATION,** comprising 300-kw 275-volt G-E sealed-ignitron mercury-arc rectifier, Pyranol transformer, and complete automatic a-c and d-c switchgear, in a mine of the Sahara Coal Co., in Saline County, Ill. Use of such portable substations allows conversion to direct current thousands of feet closer to the working face—saves the tons of copper needed for long, low-voltage d-c feeders, assures full voltage for efficient operation of cutters, loaders, and other equipment.

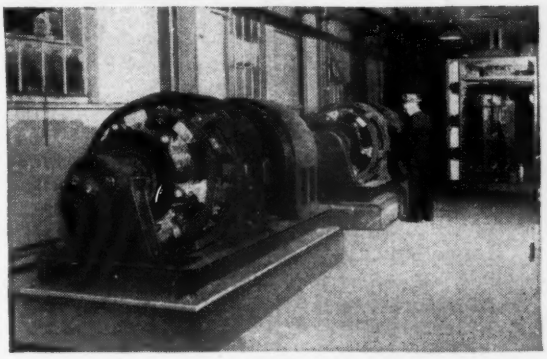
●

**Buy all the BONDS you can—*and keep all you buy***

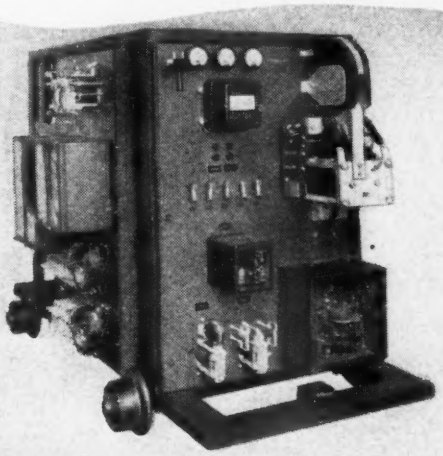


# WHERE YOU WANT IT

Here's practical evidence that you can depend on G.E. for the *right* d-c power supply, backed up by the right switchgear to protect continuity all the way from the incoming power lines to the d-c at the working face.



**THREE 250-KW G-E MOTOR-GENERATOR SETS** for supplying direct current in a large mine development. G-E synchronous converters are also available for mining service.

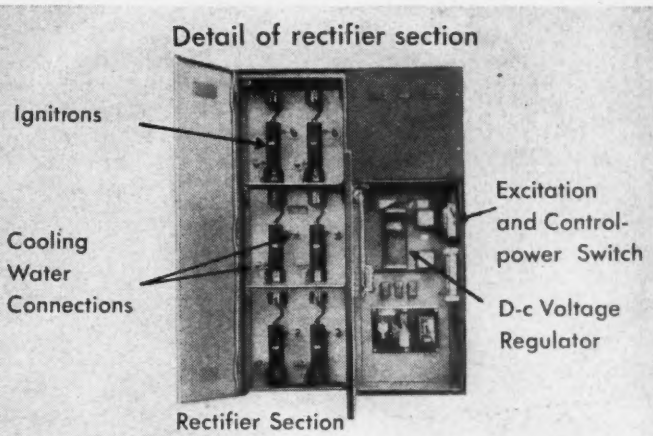


**G-E PORTABLE AUTOMATIC SWITCHGEAR** for controlling a 250-kw induction m-g set.

*General Electric Co., Schenectady 5, N. Y.*

## *For HIGH Conversion Efficiency*

## G-E SEALED-IGNITRON MERCURY-ARC RECTIFIERS




G-E sealed-ignitron rectifiers, the heart of the stationary and portable unit substations shown on the opposite page, possess high over-all efficiency over the entire load range. In addition, they offer the advantages of low maintenance cost, quick starting, and freedom from high starting-inrush currents. Like other components of G-E unit substations, these rectifiers are easy to install and easy to relocate if load requirements change.

**GENERAL ELECTRIC**

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U.S. Royal Mining Machine and Locomotive Cables, as an example, have been known in the mining industry for many years for their balanced construction, flexibility dielectric strength, smoothness of finish and physical toughness.

*"U. S." Royal Safety Tested Mining Machine and Locomotive Cables are now available at our "U. S." Branches.*

# THE NEW *Safety Tested* LOCOMOTIVE CABLES

Now comes a new development in rubber technology greatly speeded by critical wartime needs...a new material, successfully embodied in the new line of U.S. Mining Machine and Locomotive Cables...and these have been given the name "U.S. ROYAL."

These new U.S. Royal Safety Tested Cables offer to mine operators all the qualities essential for long, economical, trouble-free service. They truly merit the name "Royal."

## UNITED STATES RUBBER COMPANY

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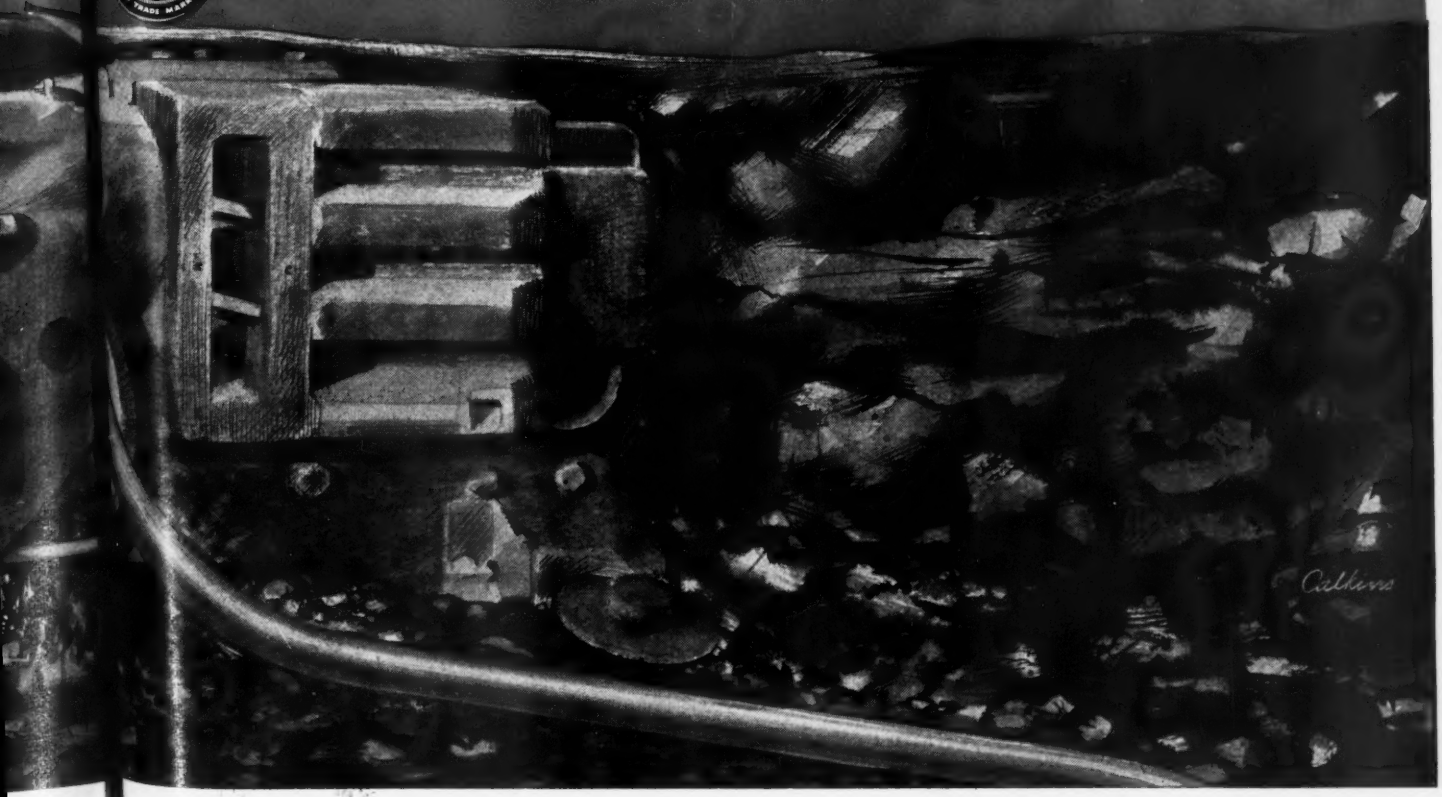
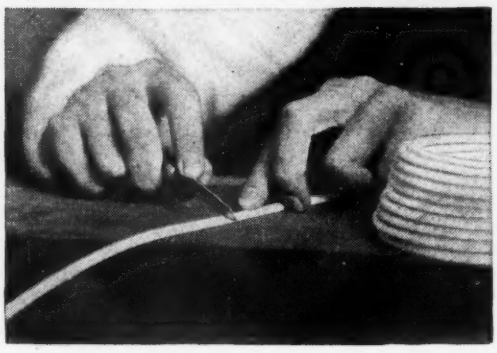
*Serving through Science*



## *Notes to Shot-Firers—*

# Five Ways to Avoid Misfires with Cap and Fuse



Misfires, especially in wet holes, have become more frequent since so many inexperienced miners are now preparing cap and fuse primer assemblies. And one misfire can cost more than a month of precaution. Here are five simple precautions to help you in reducing misfires.

1. Cut a piece from the end of the fuse before using.
   *The end of the fuse absorbs moisture, which hurts its efficiency.*
2. Cut squarely across the fuse end with a clean, sharp knife.
   *A dull tool may smear tar over the end of the powder train. A slant edge may curl over and stop the spit of the fuse.*
3. Set the cut end of the fuse firmly against the detonating charge in the cap, and crimp with a cap crimper.
   *Crimping caps with makeshift tools such as pliers and jackknives is ineffective in wet work and unsafe.*
4. Waterproof the crimp, particularly in wet work.
   *Use only recommended sealing compounds such as "Celecap", "Kapseal", "Fuse and Cap Seal" and others.*
5. Put waterproofed cap and fuse primer cartridge assembly into a paper tamping bag as added protection against moisture.

***Synergism:**
*The force that produces a "2+2=5" result, so to speak, when both you and we get together and really "click".*

By analyzing the "lay of the land"—and by exchanging ideas freely with customers, Atlas Representatives are often able to help speed production *and* increase safety. If you have a "different" blasting problem, put it up to Atlas. See how synergism* pays.

**ATLAS** EXPLOSIVES
*"Everything for Blasting"*

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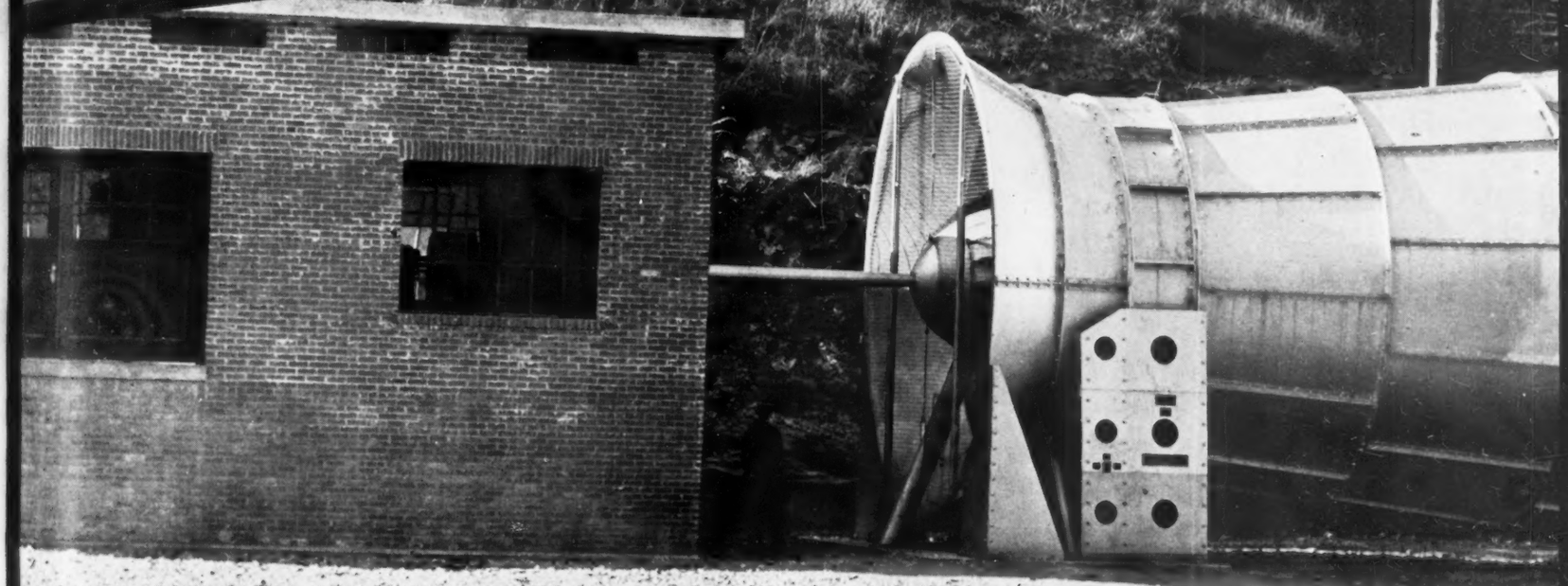
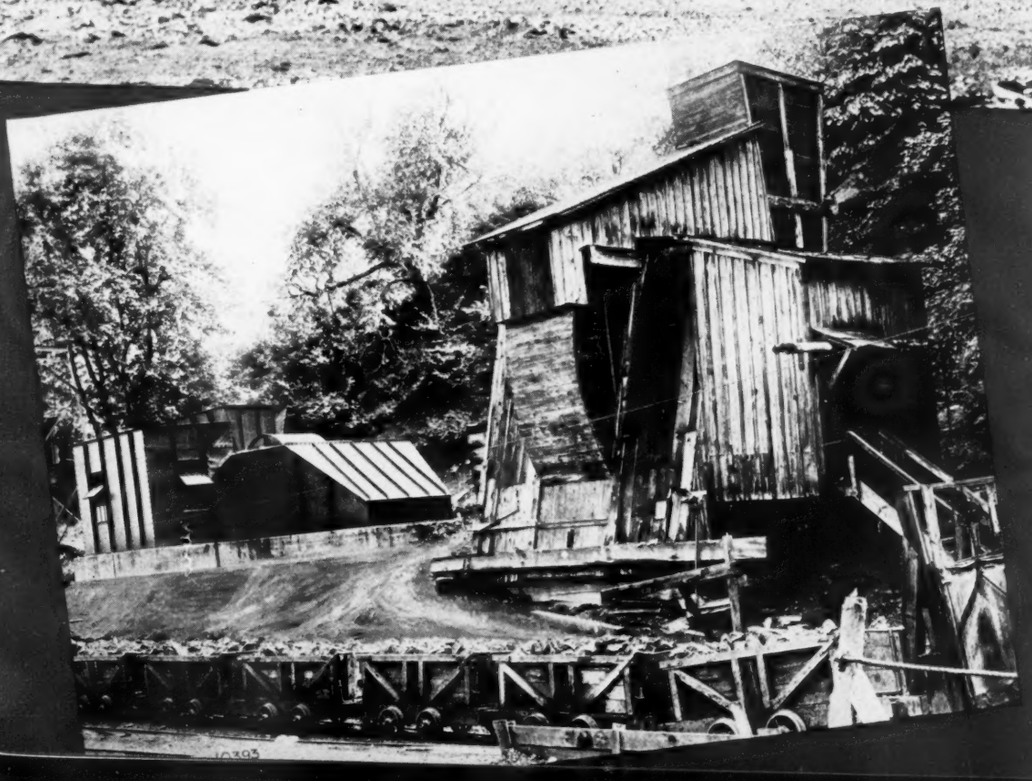
**ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpow**

# MINE VENTILATION SHOWS DISTINCT PROGRESS WITH THE JEFFREY AERODYNE





(Patented)

## JEFFREY

Here the com
Fan with on
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The Jeffrey
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— 550,000
1000 B.H.P

Jeffrey has
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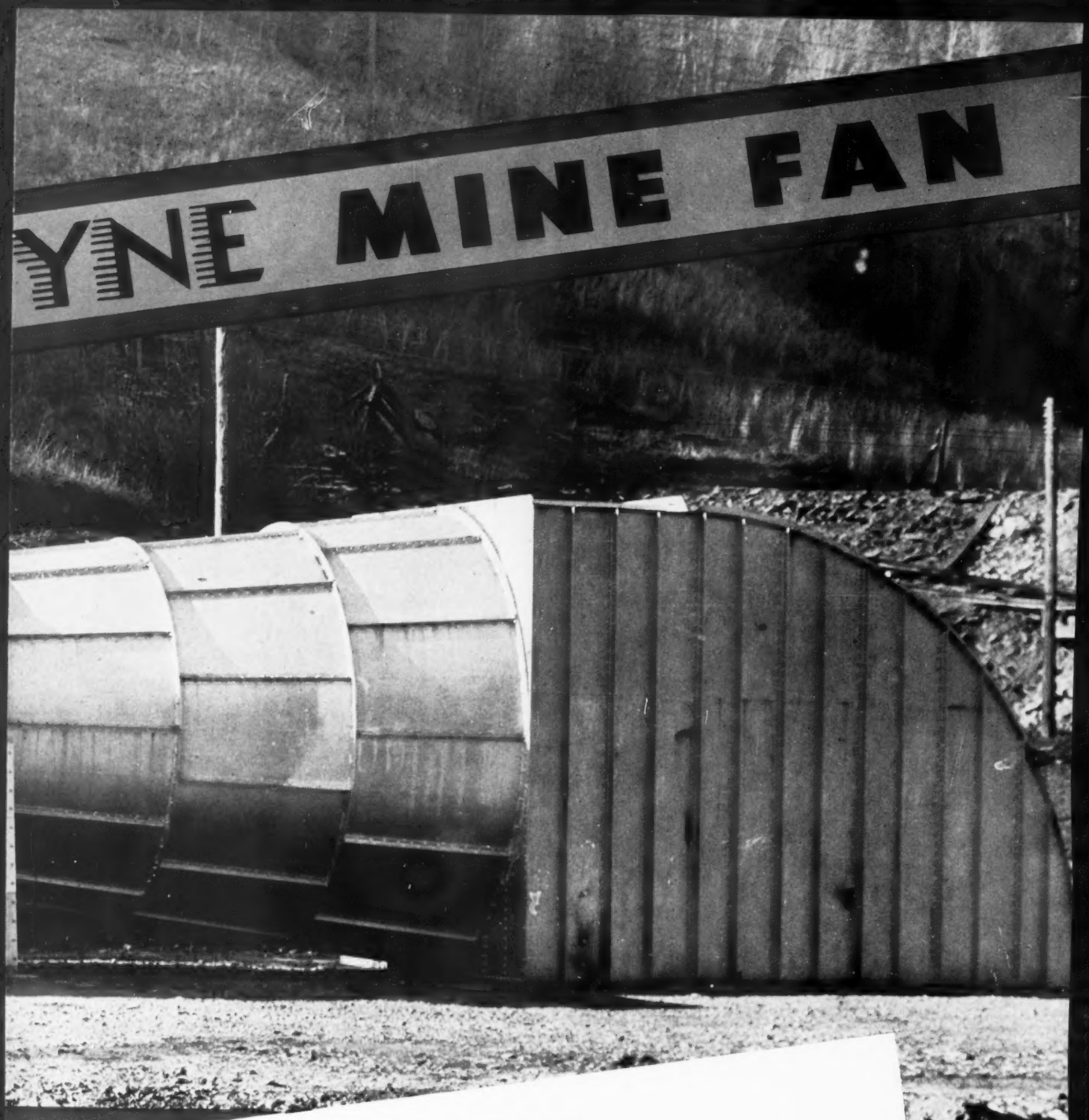
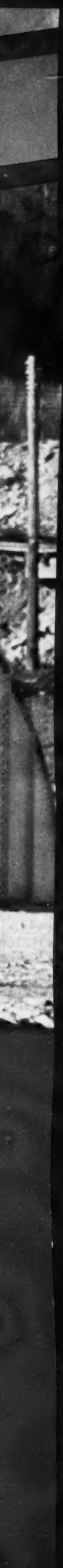



# JEFFREY PROGRESS

Here the comparison of a modern Jeffrey Aerodyne Fan with one of the old model centrifugal types, illustrates graphically the progress Jeffrey has made in mine ventilation.

The Jeffrey 8-H Aerodyne shown above has a 117-inch rotor with adjustable pitch blades. Capacity — 550,000 cubic feet at 9" W. G. — 840 R. P. M. at 1000 B.H.P.

Jeffrey has both the engineering staff and manufacturing organization to determine, design, build and install the proper ventilating equipment for safe, efficient underground ventilation. Full descriptive bulletins available.



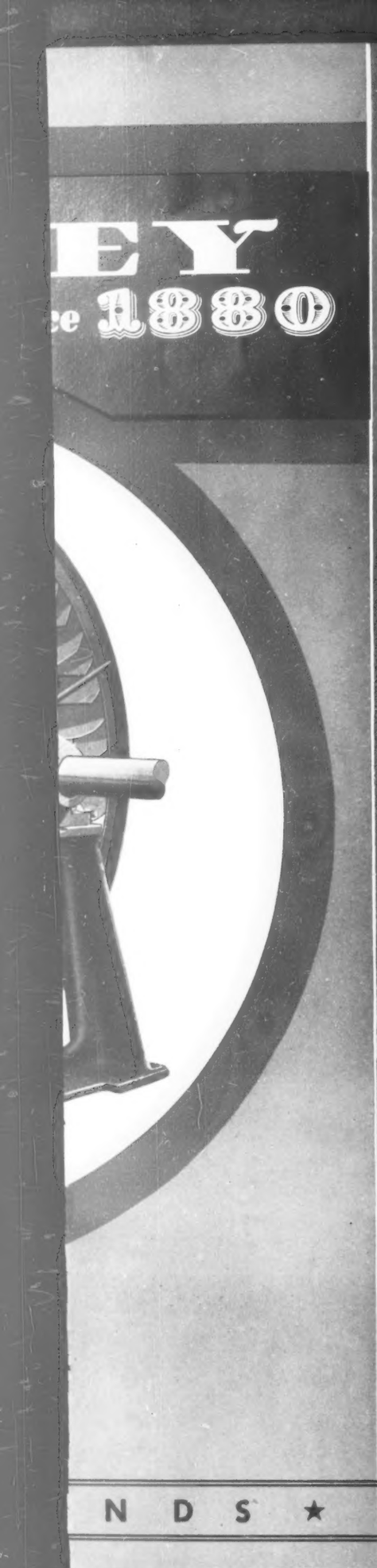
N

# JEFFREY

## Mechanical Mine Equipment Since 1880

*Early Model Vane Type Jeffrey Fan*

★ BUY WAR BONDS ★




# Jeffrey

## SERVES THE INDUSTRY
## BELOW AND ABOVE GROUND
## FROM FACE TO RAILROAD CAR

**CUTTERS**
**DRILLS**
**LOADERS**
**LOCOMOTIVES**
**FANS**
**CONVEYORS**
**BLOWERS**
**JIGS**
**CRUSHERS**
**SCREENS**
**RENEWAL PARTS**

## THE JEFFREY MANUFACTURING COMPANY

*Established in 1877*

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

**Sales Offices:** Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake C

**Service Stations:** Pittsburgh, Harlan, Ky., Birmingham, St. Louis, Logan-Beckley, W. Va., Scranto

**Foreign Plants:** Jeffrey Mfg. Co., Ltd., Montreal, Quebec; British Jeffrey-Diamond, Ltd., Wakefield, England; Jeffrey-Galion (Pty), L Johannesburg, S. A.

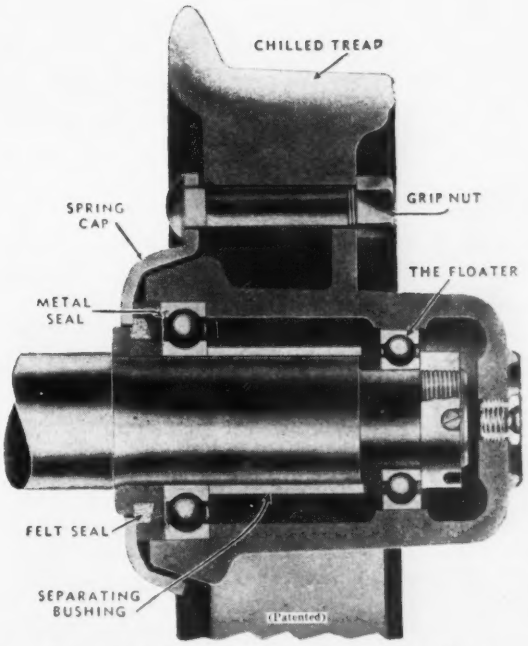
# You may have a Production Bottleneck HERE!

★ During these days hundreds of little leaks, little bottlenecks on the war production front, have been uncovered. Finding them and eliminating them, in many cases, has resulted in tremendous savings in time, material, money and manpower. Let's consider one of these leaks in mining.

In many mines, wheels and trucks have been an orphan child, so to speak. And, with so little attention given to their vital importance, they have become little bottlenecks to production—retarding output, wasting grease, labor and power.

If you are not using S-D "Floater" Ball Bearing Wheels, you may, unknowingly, have a production bottleneck. For, engineers' tests have proved that your locomotives can handle almost 50 per cent more load when the cars are equipped with S-D "Floaters" than when equipped with wheels having other types of precision bearings. Furthermore, your own cost of greasing will be held to that of one greasing in 5 years, and wheel castings and bearings are guaranteed for 5 years against breakage, excessive wear or failure.

Don't wait any longer to check your wheels. They may be costing you plenty.




You can test S-D "Floaters" for yourself on our FREE TRIAL PLAN. Write to us now.

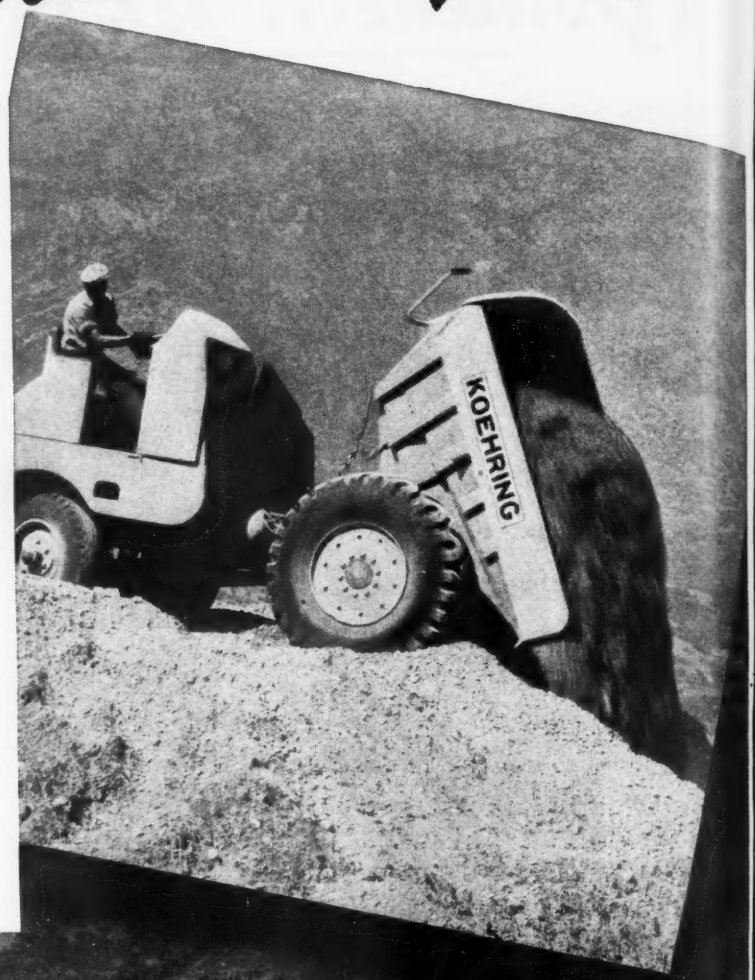
**Sanford-Day Iron Works, KNOXVILLE, TENNESSEE**

# Instantaneous Dumping

## ROCK or DIRT
## Dumped Instantaneously

Moving rock or dirt at high speed requires speed in all operations. Koehring Dumptors save seconds every time the load is dumped . . . instantaneously. Seconds saved speed production. Rock or dirt is dumped equally fast and the load is dumped clean every time . . . ready for a full load every trip. KOEHRING DUMPTORS HAUL ROCK OR DIRT FASTER THAN ANY OTHER METHOD.

**KOEHRING COMPANY**
*Milwaukee 10, Wisconsin*

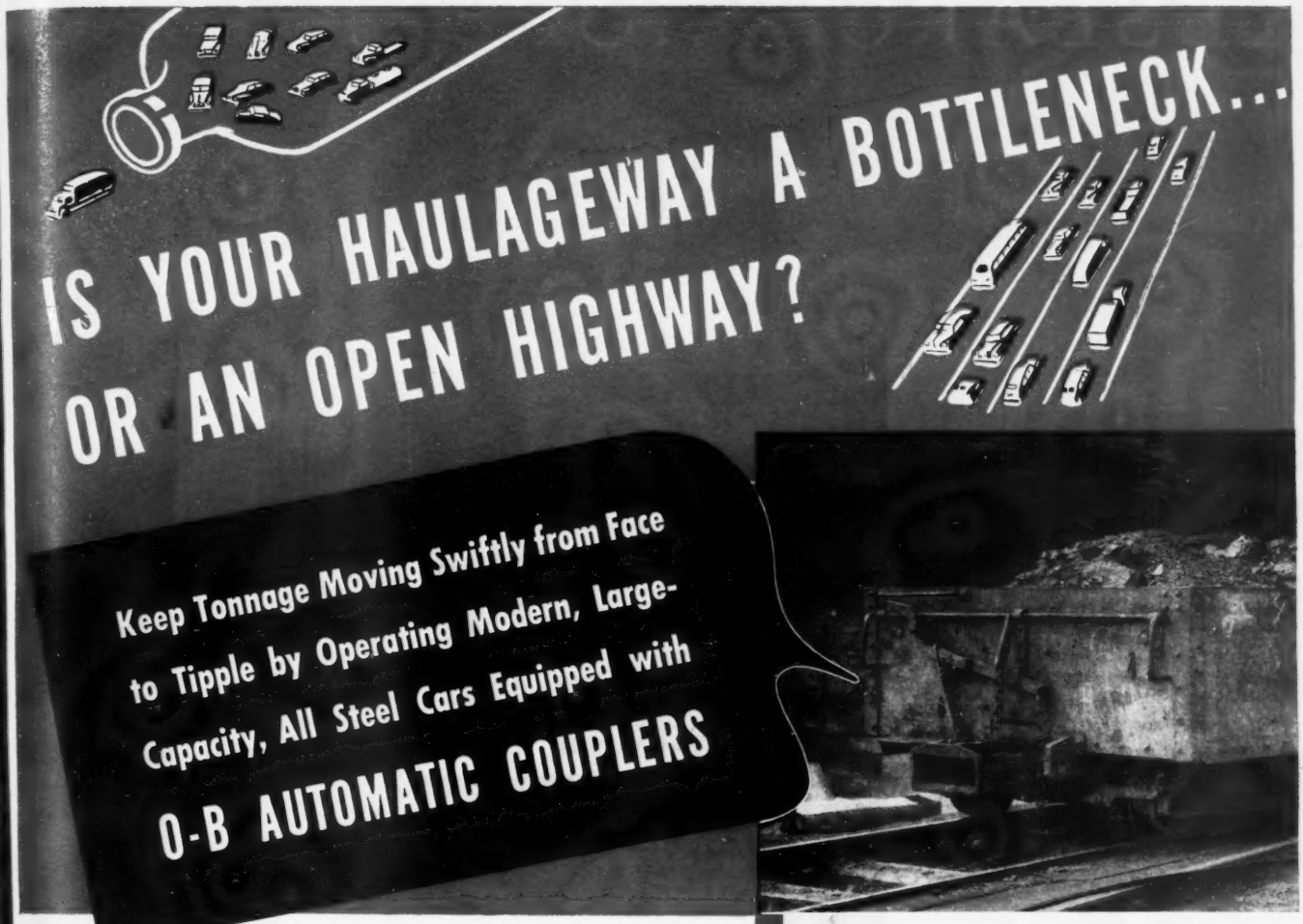


**DEPEND ON YOUR KOEHRING DISTRIBUTOR** to help you keep your equipment operating. Care for your Koehring equipment *NOW*, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

ARMY E NAVY

KOEHRING HEAVY DUTY

**HEAVY-DUTY CONSTRUCTION EQUIPMENT**


IS YOUR HAULAGEWAY A BOTTLENECK...
OR AN OPEN HIGHWAY?
Keep Tonnage Moving Swiftly from Face to Tipple by Operating Modern, Large-Capacity, All Steel Cars Equipped with
O-B AUTOMATIC COUPLERS

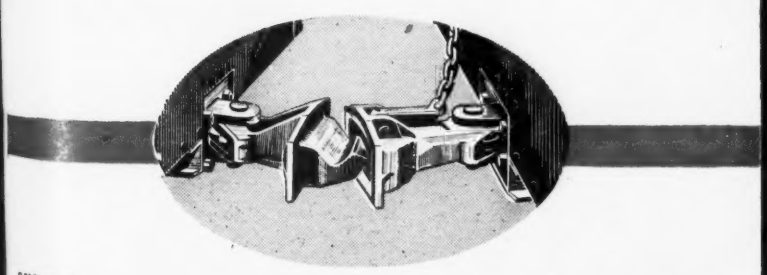
● Extra face output must reach the tipple before it can rightfully be called "increased production". Your haulage system can help by keeping pace with your loaders—or it can lag behind causing a bottleneck in tonnage flow. Keep your haulage capacity in balance with face output by operating modern, large capacity mine cars—and equipping them with O-B Automatic Couplers for greater handling speed, greater personal safety. Make it a point to discuss modern, automatic-couplered mine haulage with your O-B representative at the earliest opportunity.

**1. More tonnage with fewer cars**—extra capacity means fewer cars to do the same job.

**2. Faster car handling, greater haulage speeds**—fewer car changes under the loader with large-capacity cars. Rigid couplered connections buffered by rubber draft gears, permit faster haulage speeds with less chance of derailment or coal spillage.

**3. Lower maintenance**—All steel construction, anti-friction bearings and rubber draft gear keep cars out of the repair shop—on the job hauling coal for you.

**4. Greater personal safety**—No need for workmen to enter "Danger Zone" between cars. Cars couple automatically, upon impact—uncouple with the flip of a lever safely located on outside of car. Fewer lost-time accidents mean more production.



**Ohio Brass**

MANSFIELD, OHIO

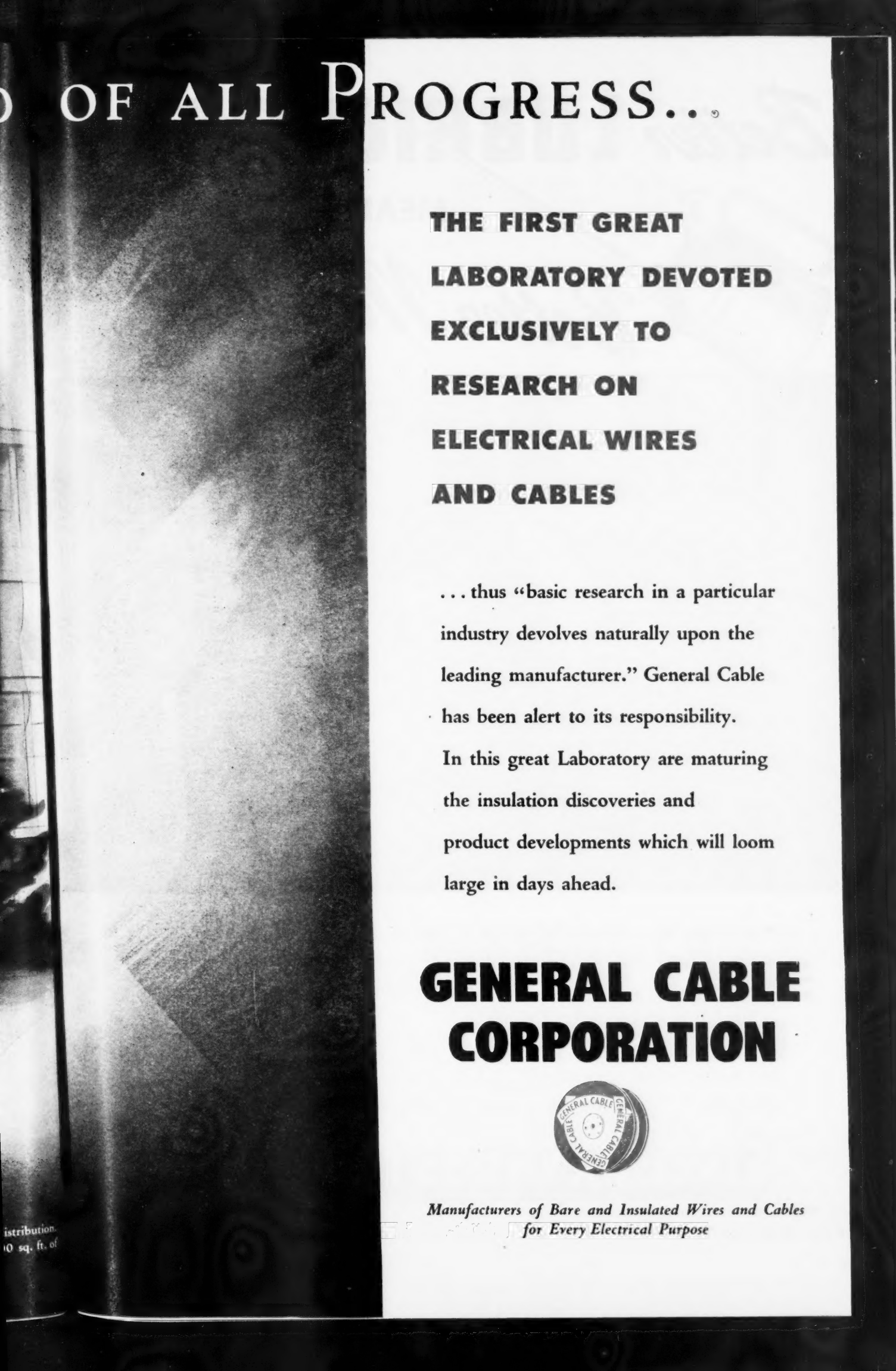
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS

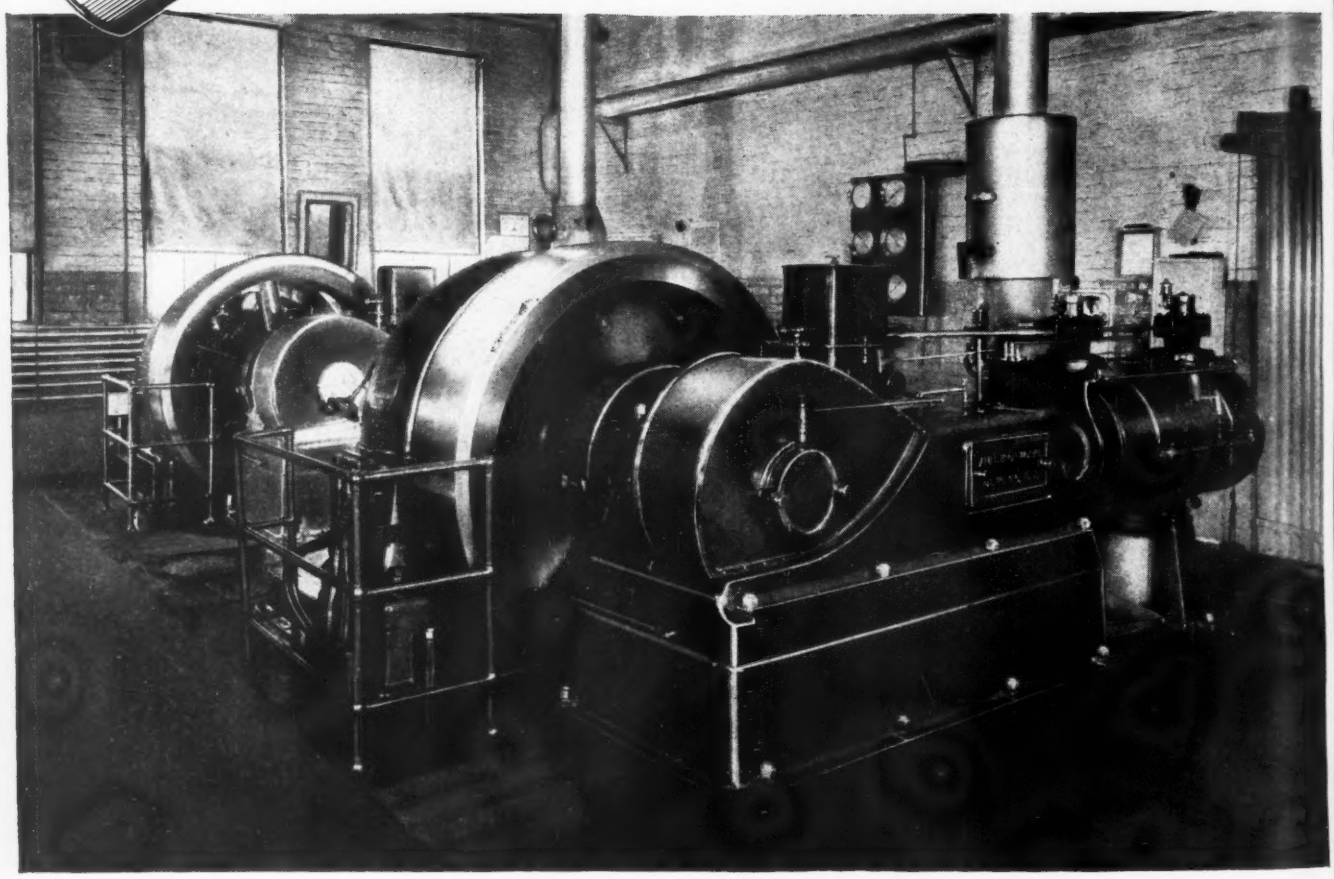
2512—AM

# RESEARCH...SPEARHEAD

The 80 practical specialists who work in this magnificent building at Bayonne, N. J., have every facility—chemical, physical, metallurgical—to aid them in bringing nearer their goal—extending to the utmost the effective means of electrical transmission and distribution. Built in 1941, the structure has already grown to 60,000 sq. ft. of floor space—is planned for further expansion as needed.


OF ALL PROGRESS...
THE FIRST GREAT
LABORATORY DEVOTED
EXCLUSIVELY TO
RESEARCH ON
ELECTRICAL WIRES
AND CABLES
. . . thus "basic research in a particular industry devolves naturally upon the leading manufacturer." General Cable has been alert to its responsibility.
In this great Laboratory are maturing the insulation discoveries and product developments which will loom large in days ahead.
GENERAL CABLE
CORPORATION
GENERAL CABLE
Manufacturers of Bare and Insulated Wires and Cables
for Every Electrical Purpose

# *Better* LUBRICATION MEANS *Better Maintenance*



• Excessive wear and difficult maintenance often result from inadequate lubrication.

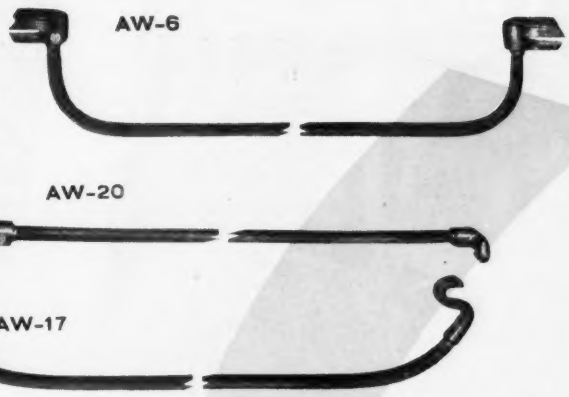
Sinclair provides Steam Cylinder and Valve Oils for *better lubrication* and better maintenance of *STEAM ENGINES.* These oils reduce wear under all load conditions and satisfy any combination of speed, temperature, pressure, moisture requirements.

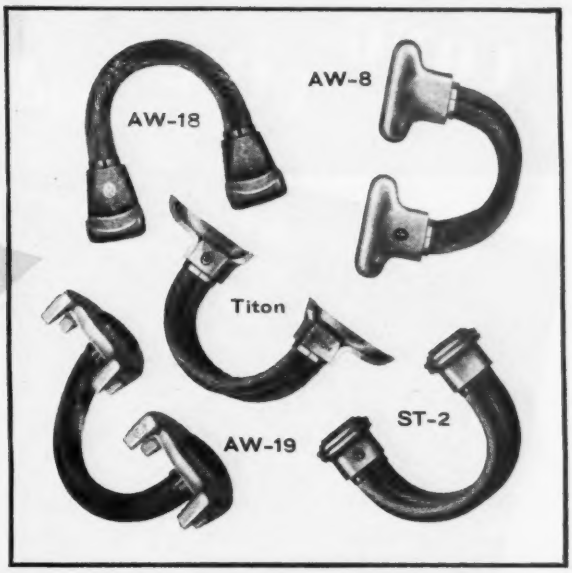
• • •

*(Write for "The Service Factor" — published periodically and devoted to the solution of lubricating problems.)*

**SINCLAIR INDUSTRIAL OILS**

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.




# *There's a* TYPE *and* SIZE *of* O-B RAIL BOND

## to meet all mining track requirements

Whether it's gas-welded, electric-welded or mechanically applied bonds; cross bonds, short "U" type or long around-the-joint-plate bonds; permanent or temporary bonds, there's a type and size in the O-B line to meet your most exacting conditions. Carefully designed by men familiar with mining and track requirements, and manufactured under rigid factory controls for product uniformity, O-B rail bonds are backed by more than 40 year's experience in serving the mining field. Pictured on this page are representative bonds of the O-B line. For a complete listing and ordering data, see pages 113 to 134 of your No. 22 Catalog.

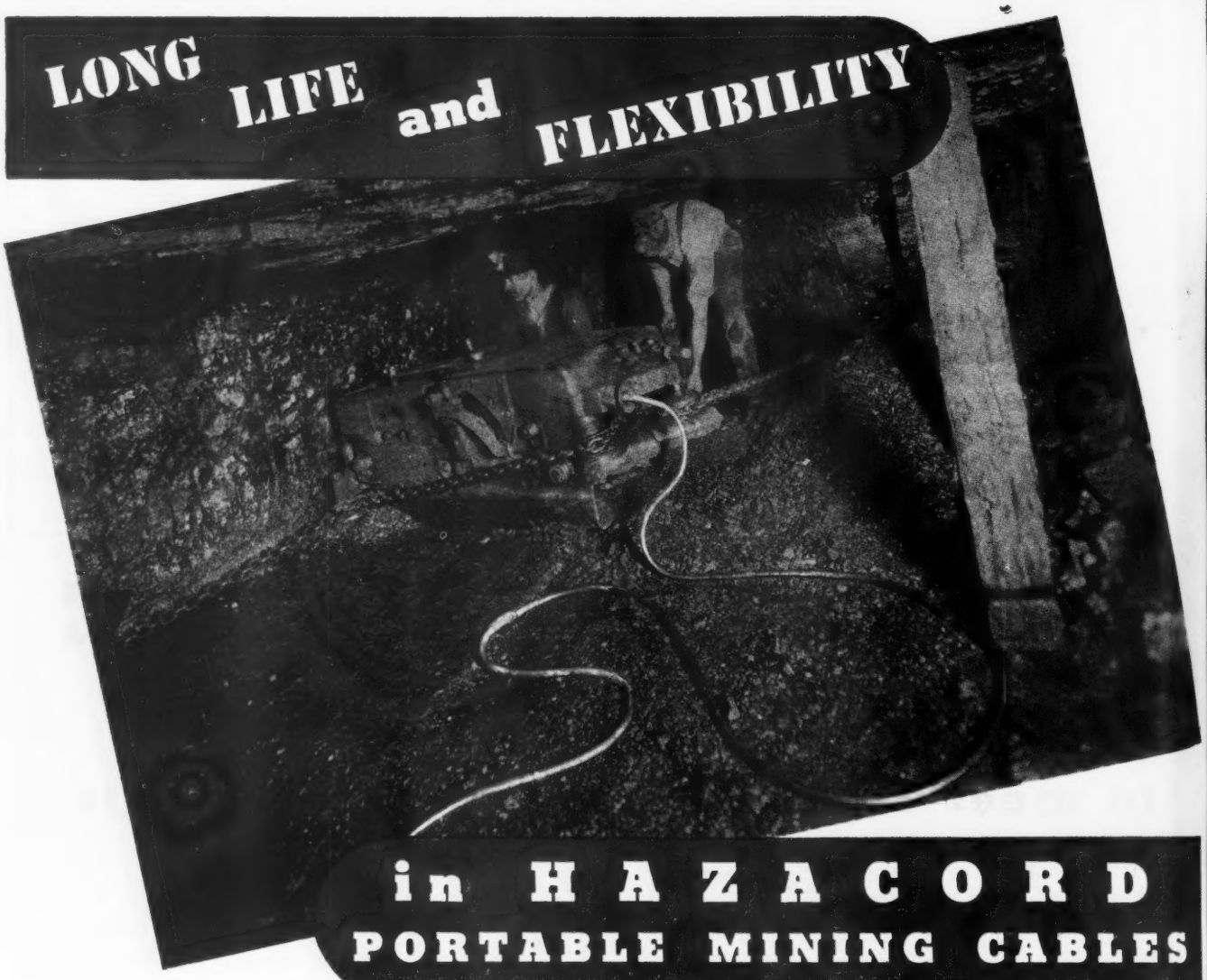
2511-M

**Ohio Brass**

MANSFIELD, OHIO

CANADIAN OHIO BRASS COMPANY, LIMITED
NIAGARA FALLS, ONTARIO

# LONG LIFE and FLEXIBILITY



## in HAZACORD PORTABLE MINING CABLES

LONG LIFE is only a comparative term as applied to mining machine cables because of the punishment inflicted upon the jacket by the constant scraping and pulling around corners, over switch latches, and across mining floor rubble.

Hazacord Portable Cables are designed to withstand such hard usage by:

Extra flexibility of conductors, making cables limp and easy to handle. For No. 8 to No. 2, 133 wire strands is standard, although finer stranding is available.

Extra firm, strong, synthetic rubber insulation on each conductor. High tensile strength reduces to a minimum any tendency to "short" under abuse.

Extra tough, resilient, tear-proof, reinforced, synthetic rubber jacket, vulcanized in continuous metal molds, gives a smooth finish, density and an exceptionally high tensile strength.

Modern composition and processing combine to give greater toughness, strength and longer life to Hazacord Cables.

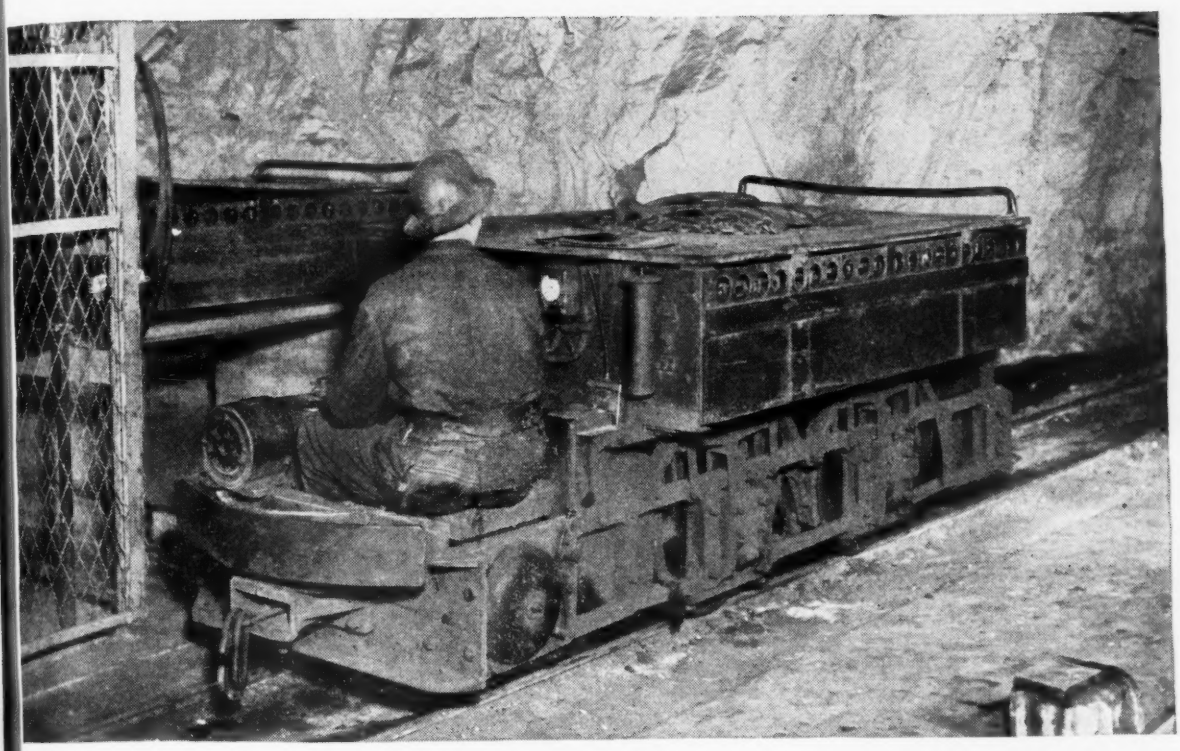
Send for the 48-page Hazard Mining Catalog — No. 179. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

ARMY E NAVY

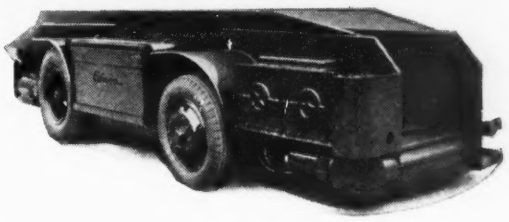
3780

HAZARD INSULATED WIRES AND CABLES
for every mining use

# NEW BATTERIES FROM OLD



Alkaline batteries give the same dependable performance in both locomotives and shuttle cars.

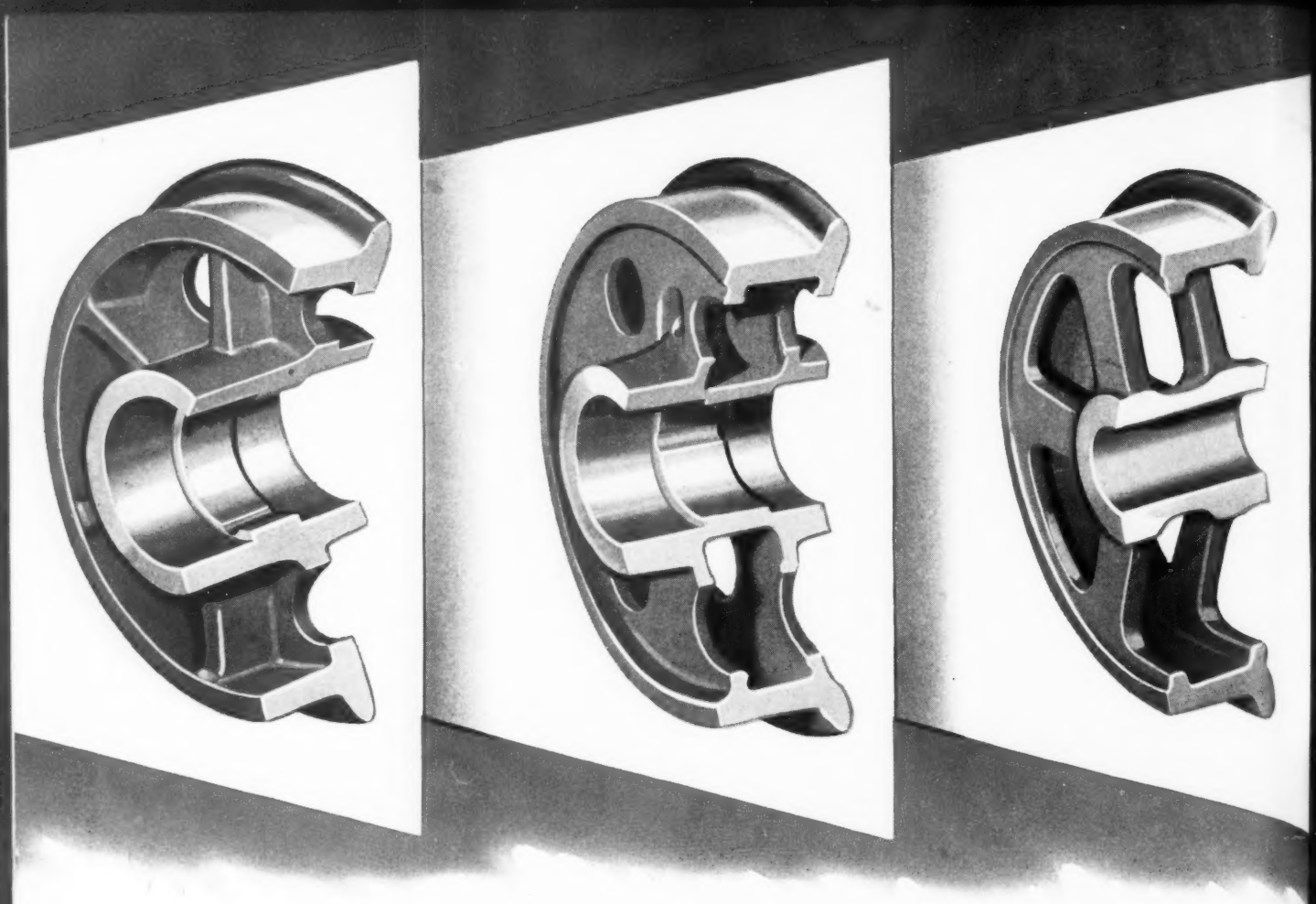


After an Edison Alkaline Battery has delivered its normal service life in a locomotive or shuttle car and has to be replaced because the battery is no longer of sufficient capacity for the work, its cells, instead of being scrapped, are often regrouped into other batteries for lighter-duty uses for which their capacity is still ample.

The electrical departments of a number of mines have been doing just that, especially since the war created the need to conserve, thus in effect getting new batteries free which, in various standby jobs, often give many more years of dependable performance. The fact that alkaline batteries can do this is a good illustration of their unequalled dependability on the original job.

The reasons are few and simple: steel cell construction; an alkaline electrolyte that is a natural preservative of steel; a principle of operation free from self-destructive reactions. Because of their long life, simple maintenance, and trouble-free characteristics, alkaline batteries also help cut haulage costs. *Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey.*

**Edison**
**ALKALINE BATTERIES**



# THE *best* MINE CAR CAN BE NO BETTER THAN ITS *wheels!*

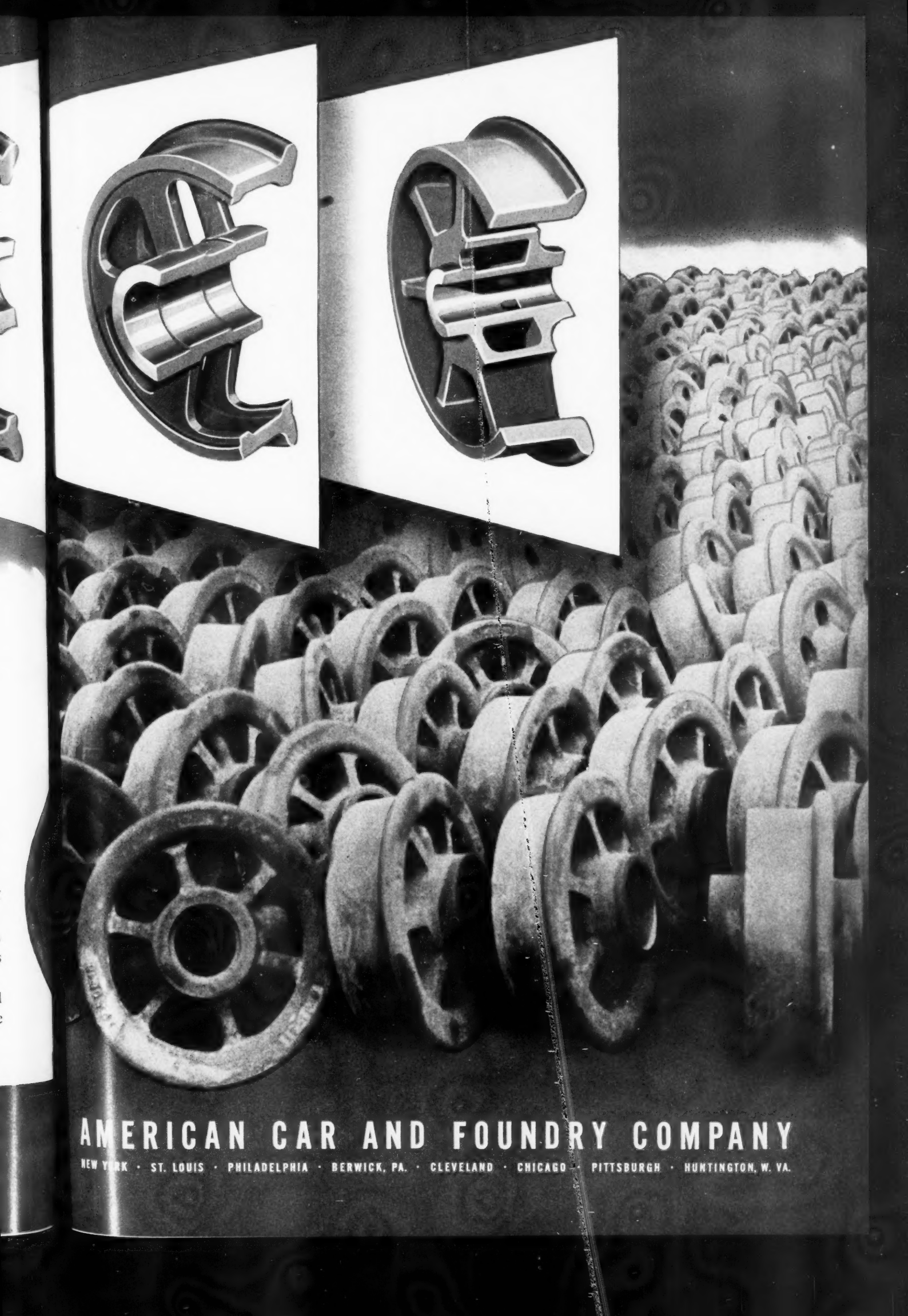
**HARD SERVICE** in a mine car starts with the wheels. A.C.F. wheels are made with chilled treads and flanges the same as the chilled tread standard gauge railroad wheels that we have made for many years, and through the use of these wheels the American railroads are kept operating at full capacity and doing such a great job today. A.C.F. chilled tread wheels operate with less power because there is less friction on the rails, and because of this, operating costs are lower.

More and more operators are aware that when loads and/or speeds increase above a certain point, all plain bearing and self oiling wheels will wear out in the hub, no matter how well lubricated.

When replacement of these old type wheels must be made, send us your order for A.C.F. modern trucks fitted with anti-friction bearings. These will meet the speed-up of the war demands —and will give you efficient equipment for years of later use at a great over-all saving.

Delivery depends upon receipt of material and other conditions beyond our control. However, we will do our best to serve you.

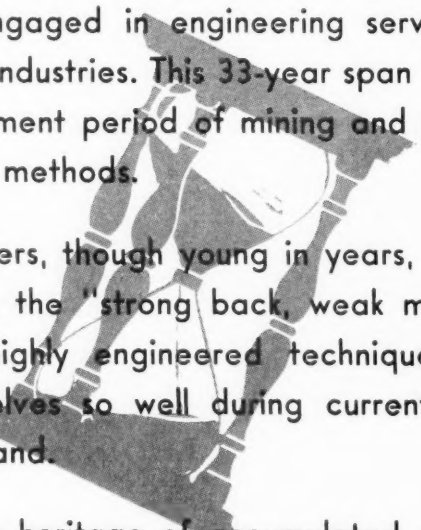
a.c.f.


AMERICAN CAR AND FOUNDRY COMPANY
NEW YORK · ST. LOUIS · PHILADELPHIA · BERWICK, PA. · CLEVELAND · CHICAGO · PITTSBURGH · HUNTINGTON, W. VA.

# Experience

"I have but one lamp by which my feet are guided and that is the lamp of experience"

*Patrick Henry*



- Founded in 1911, the Allen & Garcia Company has been continuously engaged in engineering service exclusively for the mining industries. This 33-year span "brackets" the entire development period of mining and preparing coal by mechanical methods.

A & G engineers, though young in years, have seen the transition from the "strong back, weak mind" school to the present highly engineered techniques which have proven themselves so well during current conditions of excessive demand.

Except for this heritage of accumulated experience, our efforts would be feeble.

Benefit from this experience by consulting with the Allen & Garcia Company when new problems present themselves.

**ALLEN & GARCIA COMPANY**

*CONSULTING AND CONSTRUCTING ENGINEERS*

**332 S. MICHIGAN AVE., CHICAGO, ILL. · · 120 WALL ST., NEW YORK, N. Y.**

# 6 REASONS WHY GOODYEAR CONVEYOR BELTS give longest service UNDERGROUND

OUT of many hundreds of thousands of feet of Goodyear conveyor belting installed on underground mine conveyors, more than 95% is still in use, much of it after service of six to eight years and longer. This standout performance is due to six major Goodyear advantages that should have your fullest consideration when buying belting:

1. **PROPER TROUGHING INDICES** — *insure correct idler contact; make straightline training easier; help prevent misalignment and edge wear.*

2. **ACID-NEUTRALIZING COMPOUNDS** — *keep acidic mine waters from "eating" carcass and loosening fasteners. Effective for many years.*

3. **MILDEW-INHIBITED CARCASS** — *prevents mildew-rot that ruins many belts. Tests show little loss of tensile strength in Goodyear belts exposed to bad mildewing conditions for eight years.*

4. **LONGER COVER LIFE** — *use of covers with high abrasive index plus "breaker" to increase cover-to-carcass adhesion insures maximum resistance to abrasion and stripping.*

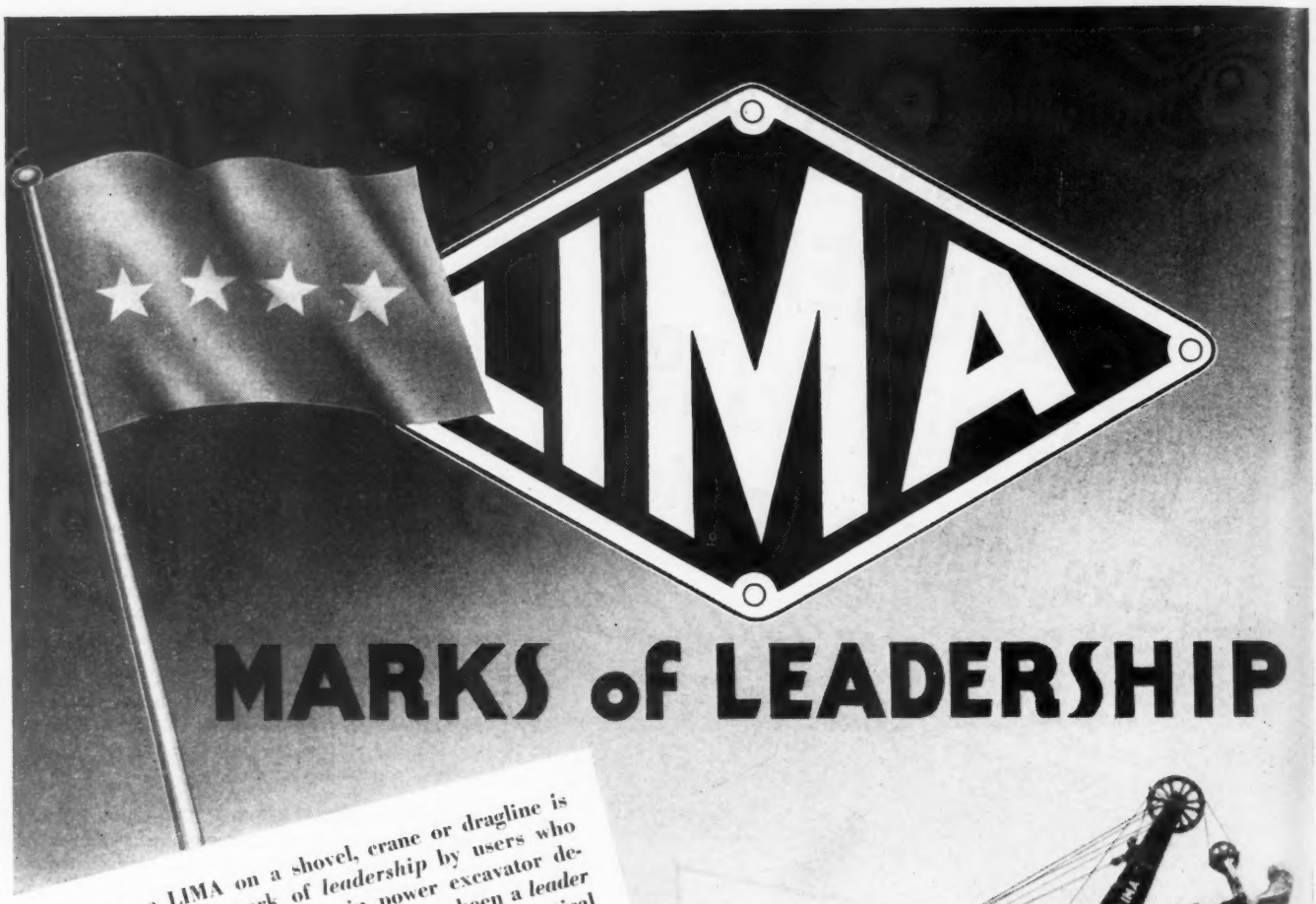
5. **HIGH FLEX LIFE** — *skim coating between plies with highest quality friction rubber triples flex life on small pulleys. No flex failure has ever been reported in a Goodyear belt.*

6. **MAXIMUM BRUISE RESISTANCE** — *finest grade covers with tough undercover cushion breaker increase cover-to-carcass adhesion, minimize danger from heavy impacts, bruising and stripping.*

You will find all these features combined *only* in Goodyear conveyor belting. Today Goodyear can supply you with belting made with synthetic rubber that is excellent in its resistance to abrasion and cutting, in flex life and cover-carcass adhesion. For full information, consult the G.T.M. — Goodyear Technical Man — or phone the nearest Goodyear Industrial Rubber Products Distributor.

**A PRODUCT OF GOODYEAR RESEARCH**

**BUY WAR BONDS—BUY FOR KEEPS**

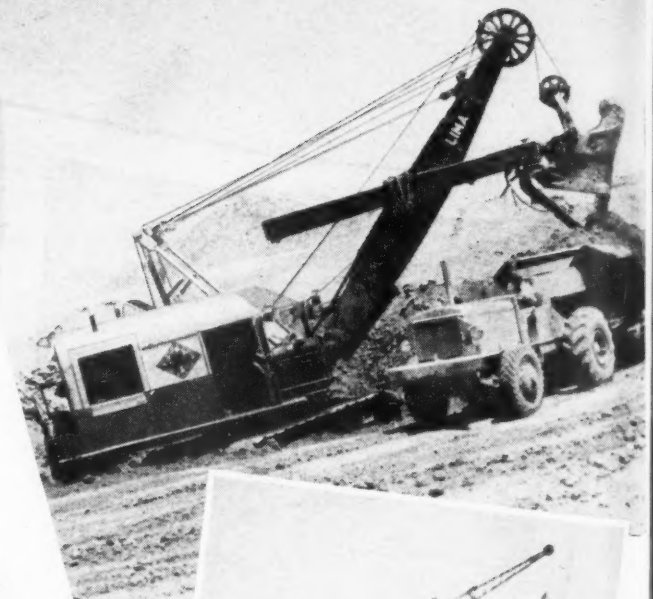



# MARKS of LEADERSHIP

The name LIMA on a shovel, crane or dragline is recognized as a mark of *leadership* by users who keep abreast with the latest in power excavator design and performance. LIMA has always been a *leader* in the designing and perfecting of new and practical features to help increase production and to lower operating cost on earth moving projects. This continuous search for new and better methods of doing things has been responsible for many outstanding advancements in excavator design. When you buy your next shovel, crane or dragline be sure it is a LIMA and get these modern distinctive features:

1. Anti-friction bearings at every vital bearing point for greater power and efficiency.
2. Independent clutches—hoist, swing, travel, boom up or down simultaneously.
3. Big wide drums for maximum cable economy.
4. All shafts on which are mounted sliding members are splined for accuracy in fit and elimination of backlash.

These advantages plus the extra power and ruggedness of LIMA shovels, cranes and draglines are qualities you must have for greater output day in and day out.



Keep Buying WAR BONDS

## LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division — LIMA, OHIO, U. S. A.

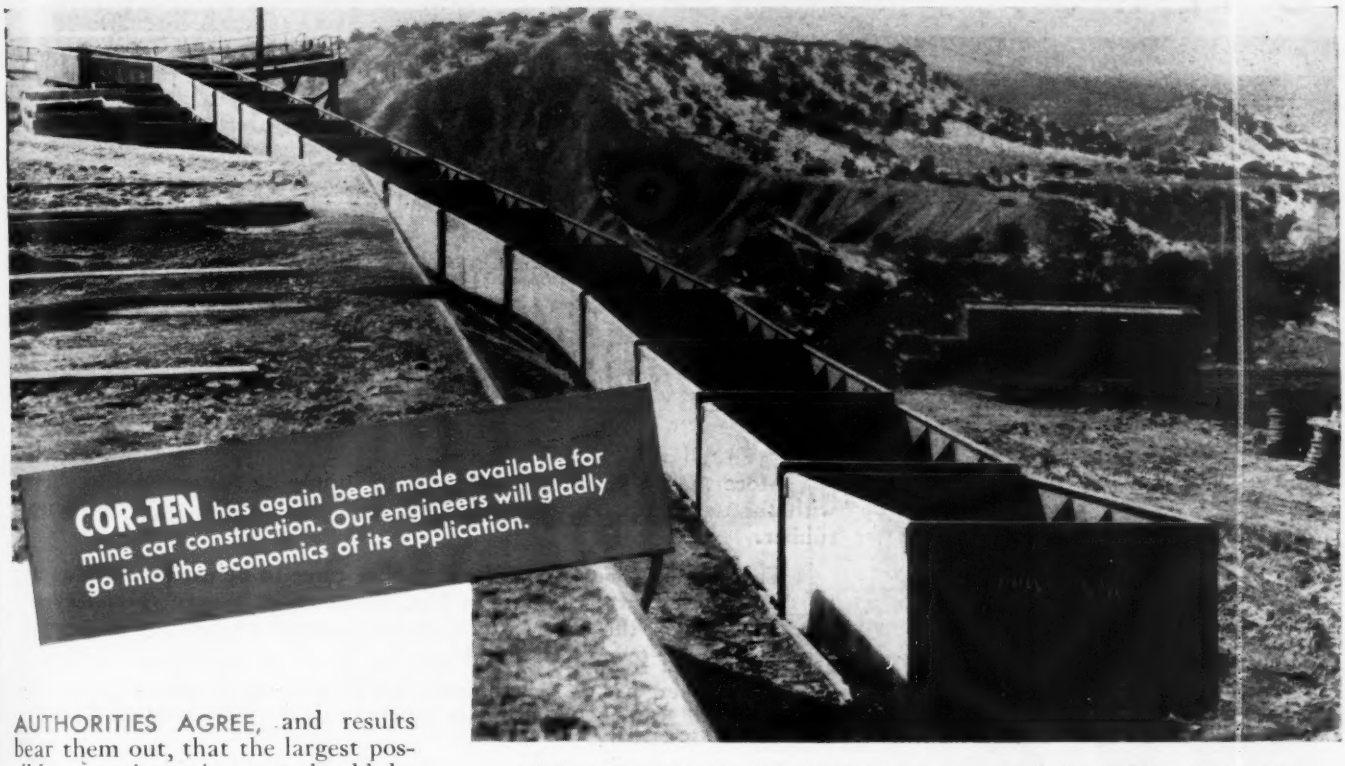
NEW YORK, N. Y. PHILADELPHIA, PA. MEMPHIS, TENN. ST. LOUIS, MO. NEWARK, N. J. PORTLAND, ORE.
DALLAS, TEXAS SEATTLE, WASH. SAN FRANCISCO, CALIF. LOS ANGELES, CALIF. SPOKANE, WASH.
MINNEAPOLIS, MINN. MONTREAL, QUEBEC, CANADA VANCOUVER, B. C.

**SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS**
**DRAGLINES, VARIABLE**

# IF YOU WANT

# *Large capacity mine cars* (WITH MINIMUM WEIGHT)

# . . . BUILD WITH COR-TEN


COR-TEN has again been made available for mine car construction. Our engineers will gladly go into the economics of its application.

● Built entirely of COR-TEN these 200 six-ton cars, streamlined and welded throughout, weigh 5290 lbs. each. Note their fine condition after 3½ years service under severe corrosive conditions hauling high sulphur coal that must be heavily sprinkled. Says the Superintendent of Mines on this operation, "Our experience to date indicates that good judgement was used in specifying COR-TEN Steel for these cars, and apparently we will obtain extremely long life and very little repairs."

AUTHORITIES AGREE, and results bear them out, that the largest possible capacity mine car should be used in any operation. For it has been shown that the time lost per ton due to car changes decreases rapidly as the capacity of the car increases up to 6-tons—is somewhat less rapid as size increases beyond this figure.

COR-TEN High-Strength Steel provides the ideal material for large capacity cars for the good reason that it permits increases in car size with the *least* increase in weight. This is possible because COR-TEN's yield strength is more than 50% higher than that of structural open-hearth steel. Thus, large-capacity, rugged cars can be built of COR-TEN to weigh substantially less than if built of heavier gage plain steel.

And because COR-TEN has greater impact strength, has 1/3 greater resistance to abrasion, has 4 to 6 times greater resistance to atmospheric corrosion, these lighter, larger capacity COR-TEN cars will stand up under hard usage and corrosive conditions. Remember, too, that every pound of weight saved is weight lifted from mine trackage, from wheels and off your power lines which means worthwhile reductions, both in maintenance and operating costs.

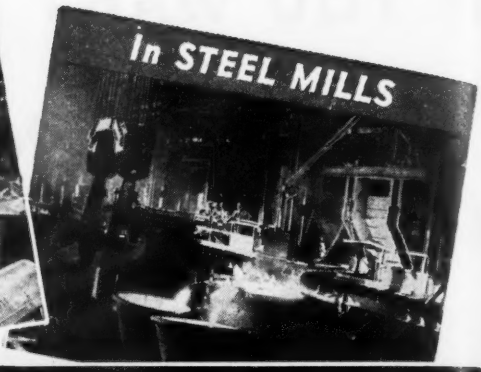
You pay no premium for using COR-TEN. In thousands of installations this superior high strength steel has proved that its proper use will increase capacity and save weight with little increase in cost.

Have you tried to get COR-TEN lately?—You'll find it just as available as ordinary steel.

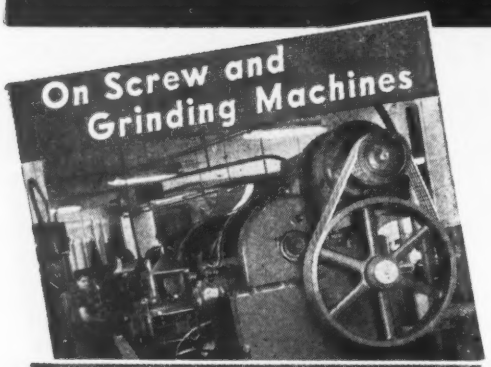
AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Export Company, New York
United States Steel Supply Company, Chicago, *Warehouse Distributors*

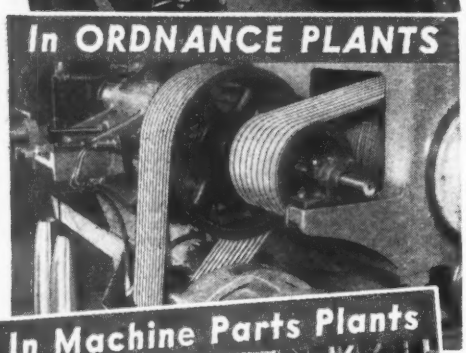
UNITED STATES STEEL

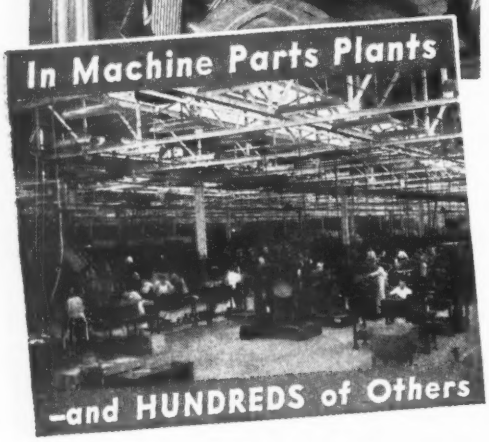
*For* MORE *than* 6 YEARS . . .




# GATES *Synthetic Rubber* V-Belts




449

## —Have Been *OUTWEARING* Any *NATURAL RUBBER* Belts Ever Used!

More than 6 years ago Gates began supplying American Industry with thousands upon thousands of V-Belts made *entirely* of synthetic rubber.

This was long before synthetic rubber came to be used merely as a *substitute* for natural rubber—in fact, Gates chose a very *special* synthetic rubber for the one reason that it is, in many important respects, *greatly superior* to natural rubber.

*** There are, of course, many kinds of synthetic rubber. Gates uses each kind where it best meets some particular service need.**

For example:—one special synthetic rubber which Gates uses extensively in making V-Belts has the ability to withstand oil and heat much better than natural rubber can. Where oil and heat conditions are especially severe, Gates special synthetic V-Belts are giving 3 times to 4 times the service life of any natural rubber V-Belts ever used.

This is the record not of a few belts over a limited period but of thousands upon thousands of Gates synthetic rubber V-Belts installed in hundreds of plants and factories during the past 6 years.

Today, as you know, all industry depends on belts made of synthetic rubber—and that is exactly why Gates' long head-start in fabricating belts of synthetic rubber is so *important* to you *NOW!*

By simply picking up your phone and calling the Gates Rubber Engineer, you can now have, in your own plant, the full benefits of Gates' greater knowledge and experience—a distinct advantage to you in *longer belt life* and in *trouble-free operation.*

## THE GATES RUBBER COMPANY

*Engineering Offices and Stocks in All Large Industrial Centers*

**GATES VULCO ROPE DRIVES**

**CHICAGO, ILL.** 549 West Washington
**NEW YORK CITY** 215-219 Fourth Avenue
**ATLANTA, GA.** 738 C & S National Bank Building
**LOS ANGELES, CAL.** 2240 East Washington Boulevard
**DENVER, COLO.** 999 South Broadway
**DETROIT, MICH.** 8663 Grand River Avenue
**PORTLAND, ORE.** 333 N. W. 5th Avenue
**DALLAS, TEXAS** 2213 Griffin Street
**SAN FRANCISCO, CAL.** 1090 Bryant Street

# The Cantrell Compressor is Indispensable to Efficient Coal Mining!

The Cantrell Type SP Compressor is shown above. Its height is only 26 in. above rail. Length 12 ft. 6 in. Complete protection of all operating parts, from rock, slate or dirt falls is provided by removable steel top.

## The Cantrell, Type SP is More Than a Dependable Air Compressor

● To investigate the use of the Cantrell, Type SP, Air Compressor in any mine means to learn that it is rapidly becoming a standard, indispensable piece of mining equipment. No longer is it necessary to waste time and expense of men and locomotives in moving your compressor from place to place.

The Cantrell SP is an independently operated compressor. It is self tramming in itself, and in addition, serves as a locomotive in pulling cars for hauling crew and equipment from place to place, in all types of work.

Furthermore, the Cantrell SP is available anytime for quick transfer of cars within the mine, taking the place of costly locomotives that may be needed for heavier hauling.

Here is a compressor that has proved its superior dependability in hard service for all air compressor service. Its self-propelling feature has proved its indispensability for faster, more economical operation.

The Cantrell SP is so essential in your mine for conserving manpower . . . so necessary for so many services, we know you cannot well afford to be without it. Let us give you the complete story. Write now to Imperial Bronze Manufacturing Co., Jellico, Tenn.

**Cantrell COMPRESSORS**

## a strong, low-velocity, water-resistant permissible

"Monobel" AA is an entirely new ammonia permissible. It has been developed to break coal in wet mines and in thick, hard shooting seams. It meets the requirements of such work because it has:

1. HIGH WATER RESISTANCE
2. HIGH CARTRIDGE STRENGTH
3. LOW VELOCITY
4. EXCELLENT FUMES

Don't overlook the possibilities of "Monobel" AA. It has a combination of properties not previously available. Get all the facts. Talk with your Du Pont Explosives Representative. Or, write to E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

INVEST IN VICTORY—BUY MORE WAR BONDS

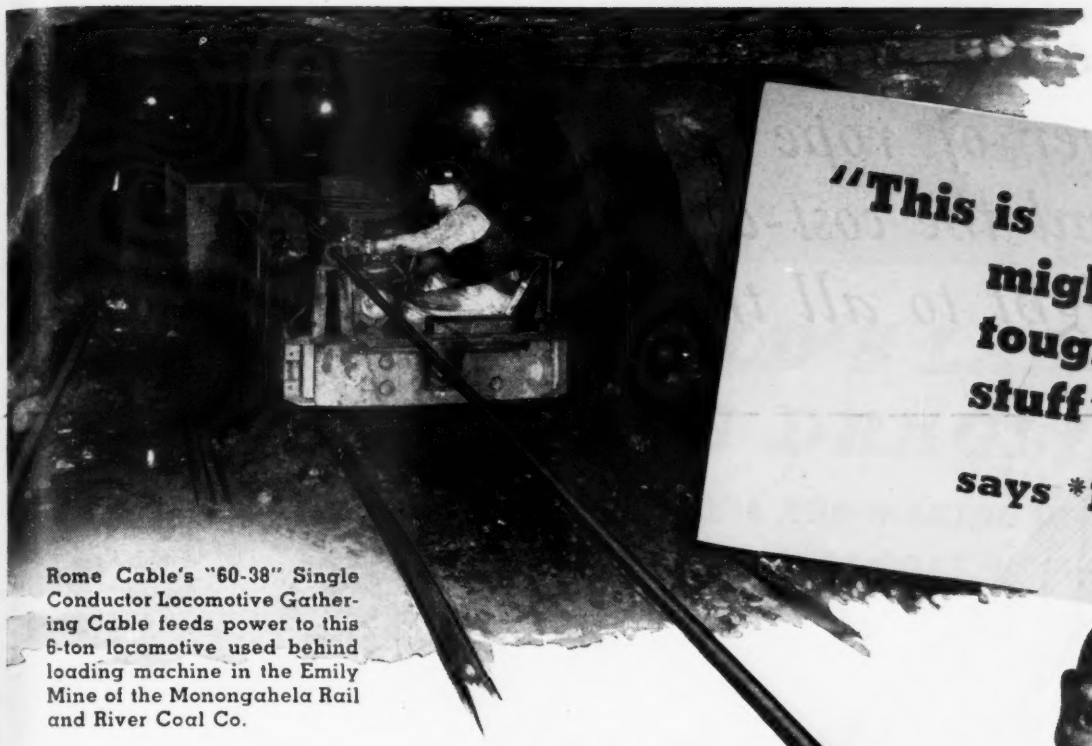
DU PONT

**A Development of Du Pont Research**

"Monobel" AA is made water resistant by a basically new method. It is another contribution of Du Pont research to the progress of the coal mining industry.

# DU PONT PERMISSIBLES

**Blasting Supplies and Accessories**



Rome Cable's "60-38" Single Conductor Locomotive Gathering Cable feeds power to this 6-ton locomotive used behind loading machine in the Emily Mine of the Monongahela Rail and River Coal Co.

# "This is mighty tough stuff"

## says *Romey

*Copr. 1944 RCC

To do the toughest, roughest job in the mine—and do it well—a locomotive gathering cable must take it on the chin day and night, and stand the gaff for months and months of uninterrupted service. . . It's a job that Rome Cable's famous "60-38" has been picked to do in many mines—mines where other dependable Rome Cable products are doing their jobs equally well.

### Rome's "60-38" Single Conductor Locomotive Gathering Cable

The ideal Locomotive Cable with complete adhesion between copper conductor and the insulation. It is protected overall with a tough Neoprene jacket. This cable is recommended for electric locomotives of the gathering reel type or any other service requiring a flexible, heavy duty portable cable, where extreme adhesion of the insulation to the conductor is desired.

**THE CONDUCTOR** is composed of rope stranded, tinned copper wires. The individual ropes are laid up in a special manner to resist both tension and torsion.

**A SPECIAL INSULATION** is used, which has high electrical qualities and extreme adhesion to copper conductor, which prevents separation of the conductor from the jacket.

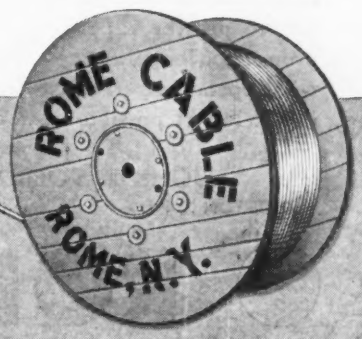
**HEAVY TWINE REINFORCEMENT CORDS** are applied over insulation to strengthen the cable and control adhesion between insulation and jacket.

**THE NEOPRENE JACKET** is vulcanized in continuous lead molds and has a high tensile strength, maximum resistance to tearing and abrasion, and long aging characteristics.

FROM BAR TO FINISHED WIRE

# ROME CABLE CORPORATION

ROME • NEW YORK



# *Even the best wire rope—alone—isn't enough. The buyer of rope for the vital war job of today and the cost-conscious job of tomorrow has a right to all that goes with good rope.*

Known Capacity
Sound Engineering
Protective Maintenance

**ROEBLING "Blue Center" STEEL WIRE ROPE**

WHAT CAN YOU EXPECT from Roebling? Rope that has known capacity to deliver service. Engineering, in our plant and at your job, to put the rope to work right. Maintenance practices that protect its long life. » » Your postwar jobs and postwar profits will depend in part upon keeping rope-rigged equipment operating at lowest possible cost. You can leave that part to Roebling.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY • Branches and Warehouses in Principal Cities

**ROEBLING**

*PACEMAKER IN WIRE PRODUCTS*

Wire Rope and Strand • Fittings • Cold Rolled Strip • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire Wire Cloth and Netting • High and Low Carbon Acid and Basic Open Hearth Steels Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

# THE WORLD'S LARGEST WALKING DRAGLINES!

## TWO OF THEM ARE MAKING PRODUCTION HISTORY IN ILLINOIS COAL FIELDS

ANOTHER **MARION** ACHIEVEMENT

ION'S latest WALKING GLINE development is a l connection on the walk- shoe that permits greater ility of machine movement automatic adjustment to d irregularities.

**The MARION 7800 WALKING DRAGLINE, capable of handling 25 to 30 cubic yard buckets, introduced a new high standard for dragline performance at a time when big yardage in vital raw materials was essential to the war effort.**

**Its exceptional digging capacity has doubled production over previously built draglines.**

**Its long range eliminates excessive rehandling costs.**

**Its unique design and walking principle assures successful operation and speedy travel under the most adverse ground conditions.**

**The two MARION 7800 WALKING DRAGLINES working in the Illinois Coal Fields ARE THE ONLY MACHINES OF THIS PHENOMINAL SIZE IN OPERATION.**

**Other MARION WALKING DRAGLINES are built with buckets that handle from 6 cubic yards and up.**

**What is your material handling problem? Our Engineers can help you. Please call us.**

*It Pays To Modernize With Marions*

CRANES ★ PULL-SHOVELS
CLAMSHELLS ★ SHOVELS
DRAGLINES ★ WALKERS
For Every Material Handling Job
3/4 cu. yd. to 35 cu. yds.

BUY WAR BONDS

E MARION **STEAM SHOVEL CO., Marion, Ohio**
OFFICES IN ALL PRINCIPAL CITIES

# * UNIFORMITY

TIDE WATER LUBRICANIA

**DEFINITION:** The uniformity of a lubricant is generally understood to mean the conformity in certain specified essential qualities between two or more separate "lots", "batches", or drums of lubricant.

**EXPLANATION:** In general a slight variation between drums of lubricant in one or more qualities —carbon residue, pour point, specific gravity, etc. — may not have any noticeable effect on the performance of the lubricant. However, if there is a variation in more than one quality — or if the variation occurs in a quality that has a critical bearing on a specific service for which the lubricant is used (i.e., Demulsibility of Steam Cylinder Oils)—then a serious variation in lubricant performance is likely to result.

**TEST:** There is no single test that can be made to determine uniformity. In practice, each "batch" of lubricant must conform to certain prescribed test limits. The lubricant is tested for certain specific qualities, depending on the service in which it is to be used. Tests may be made for Viscosity, Flash Point, Carbon Residue, Pour Point, Neutralization Number, Penetration, Specific Gravity, Color, or any other pertinent factors.

**CONCLUSION:** Most reputable refiners and marketers of lubricating oils, greases, and compounds recognize the extreme importance of maintaining uniformity. For this reason their entire manufacturing and testing procedure is scientifically conducted and strictly controlled. Regular testing by skilled technicians, using modern test equipment, provides a further means of assuring the continuing uniformity of each specific lubricant.

INDUSTRIAL TYCOL OILS-GREASES

GASOLINE POWERS THE ATTACK—
DON'T WASTE A DROP

SCIENTIFICALLY ENGINEERED
FOR EVERY INDUSTRIAL USE **TYCOL**

* This is the 13th of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

INDUSTRY'S widespread preference for Tycol oils and greases results in part from their unquestioned uniformity within each classification — from the first drum to the thousandth. Equally important is the skill with which they are engineered to meet the specific requirements of each type of service.

Whatever your lubricating need, there is a Tycol lubricant that will do the job with uniformly satisfactory results. Let a Tide Water engineer help you select the best one for your particular need. Call or write any Tide Water office for further details.

**DRUMS! DRUMS! DRUMS!**
War needs make it extremely important that all empty drums be returned immediately.

**TIDE WATER ASSOCIATED OIL COMPANY**

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL • Eastern Division: 17 Battery Place, New York 4, N. Y.

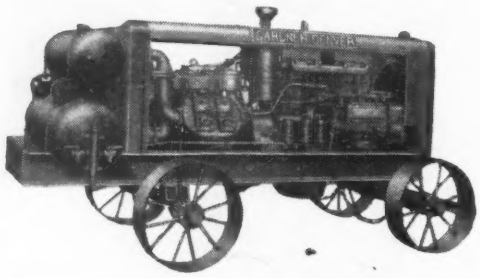
*Principal Branch Offices:* Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

# INDUSTRIAL LUBRICANTS

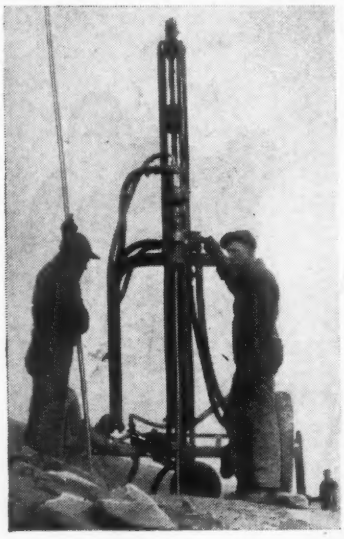
# TONNAGE ... GOING UP!

Giving your tonnage a lift . . . speeding operations . . . putting more power behind manpower, Gardner-Denver air equipment can help increase output and decrease tonnage costs wherever coal is mined.

This equipment eliminates waste time and delays that hinder production and cut tonnage. It's built to stay on the job . . . to render dependable service under the toughest operating conditions. Strip-mining or deep mining, Gardner-Denver air equipment is the answer to the question of how to get it out *faster* . . . more economically.



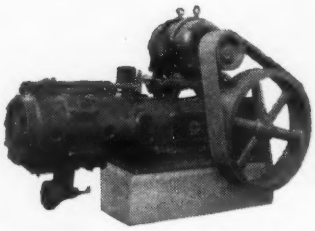
Gardner-Denver Portable Compressors are available in a complete line of gasoline or Diesel powered models. They are completely water-cooled for efficient, dependable service under all types of weather conditions.



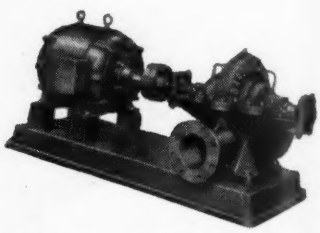
Gardner-Denver Sinking Drills are exceptionally easy-handling drills whose fast, powerful blow speeds drilling in the toughest overburden. The 31-pound Model S-33 is made-to-order for drilling anthracite.

Gardner-Denver Wagon Drills assure speedy drilling of deep holes in tough overburden and are famous for their powerful, hole cleaning ability.

Gardner-Denver Drifting Drills assure less operator fatigue . . . more footage per shift, because the weight of their built-in feed motors smothers vibration. Their shorter overall length permits better pointing of holes in driving entries and haulage ways.



Gardner-Denver "RX" Single Stage Horizontal Compressors deliver a large, dependable volume of compressed air at remarkably low horsepower requirements.



Gardner-Denver Double Suction Centrifugal Pumps are highly efficient units for drainage and dewatering. Designed with features that assure long, uninterrupted service, they are economical in operation.

**For complete information on Gardner-Denver Mining Equipment, write Gardner-Denver Company, Quincy, Illinois.**

Since 1859

GARDNER-DENVER

THE reasons for using wire rope are that it does the job better, faster, more efficiently, more safely, more economically. And the reasons for using the best wire rope—are the same . . . The specifications of the armed forces for wire rope are more severe than the requirements of most industries. Yet Rochester standards are in excess of their specifications . . . Most of our present output of necessity goes to meet the needs of the services . . . Today, you have no choice in buying, and we have no choice in selling. But when you can select and we can supply, your first choice should be Rochester . . . because Rochester can meet any standards for service, safety—or maintenance costs . . . At the right time, remember the name—Rochester.

**ROCHESTER *Ropes***

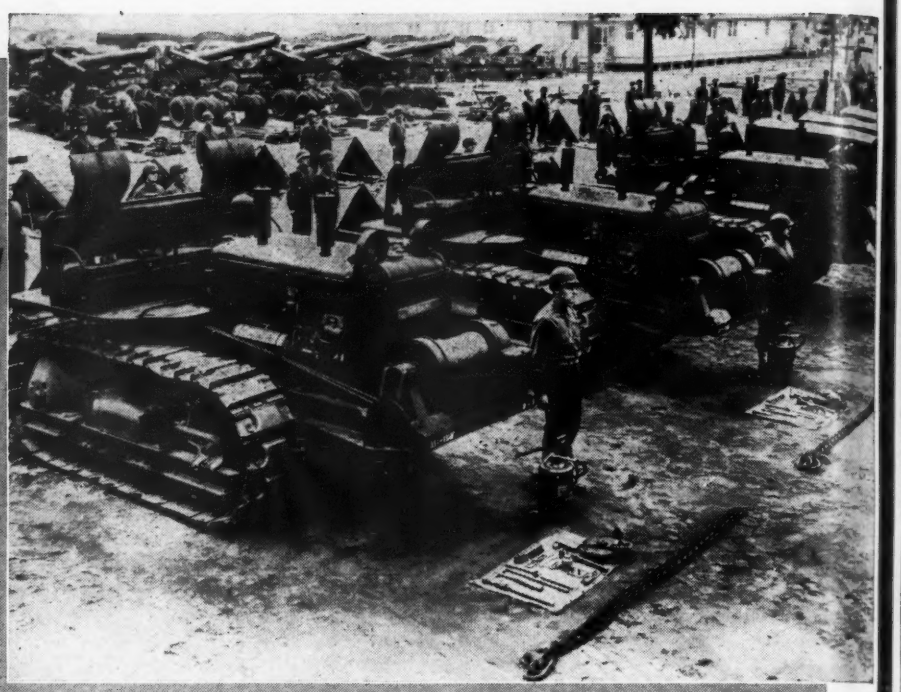
JAMAICA, NEW YORK • CULPEPER, VIRGINIA

*Culpeper, Va., and Jamaica, N.Y., plants*

INSPECTION LINE—

*or*

FIRING LINE—



—Signal Corps Photos

# "Good Soldiers," These Internationals— Wherever You Find Them

INSPECTION LINE or firing line . . . it makes no difference to these big International Diesel TracTracTors. They are ready whenever or wherever duty calls.

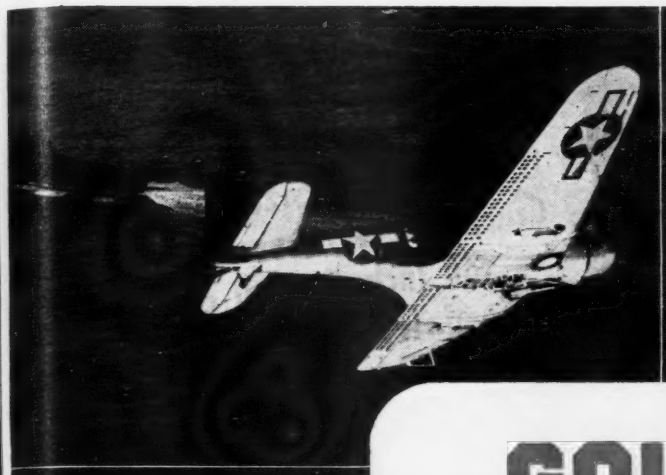
They're "good soldiers" at training camps and battlefronts, on maneuvers or under fire overseas. They're winning praises from GI's and Generals alike. They pave the way for airpower, footpower and firepower . . . *All honor to the men who drive them!*

While these tractors are fighting on the battlefront, it's up to all tractor operators to conserve equipment here on the home front. *Make it last!* Harvester and the International Industrial Power Distributors stand ready to see you through.

And in the meantime, let's all remember that it's up to all of us to fight harder on the home front . . . fight on the food front—give to the blood bank—buy extra War Bonds—fight inflation. FOR VICTORY.

**INTERNATIONAL HARVESTER COMPANY**
180 North Michigan Avenue Chicago 1, Illinois

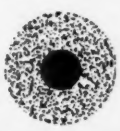
**INTERNATIONAL HARVESTER**
***Power for Victory . . . Power for Peace***



# GOULD

## HAS THE AMPERE HOURS *for a full days work*

Three special Gould features plus a half century of experience in battery building assure sustained capacity and efficient performance in the Gould Kathanode.

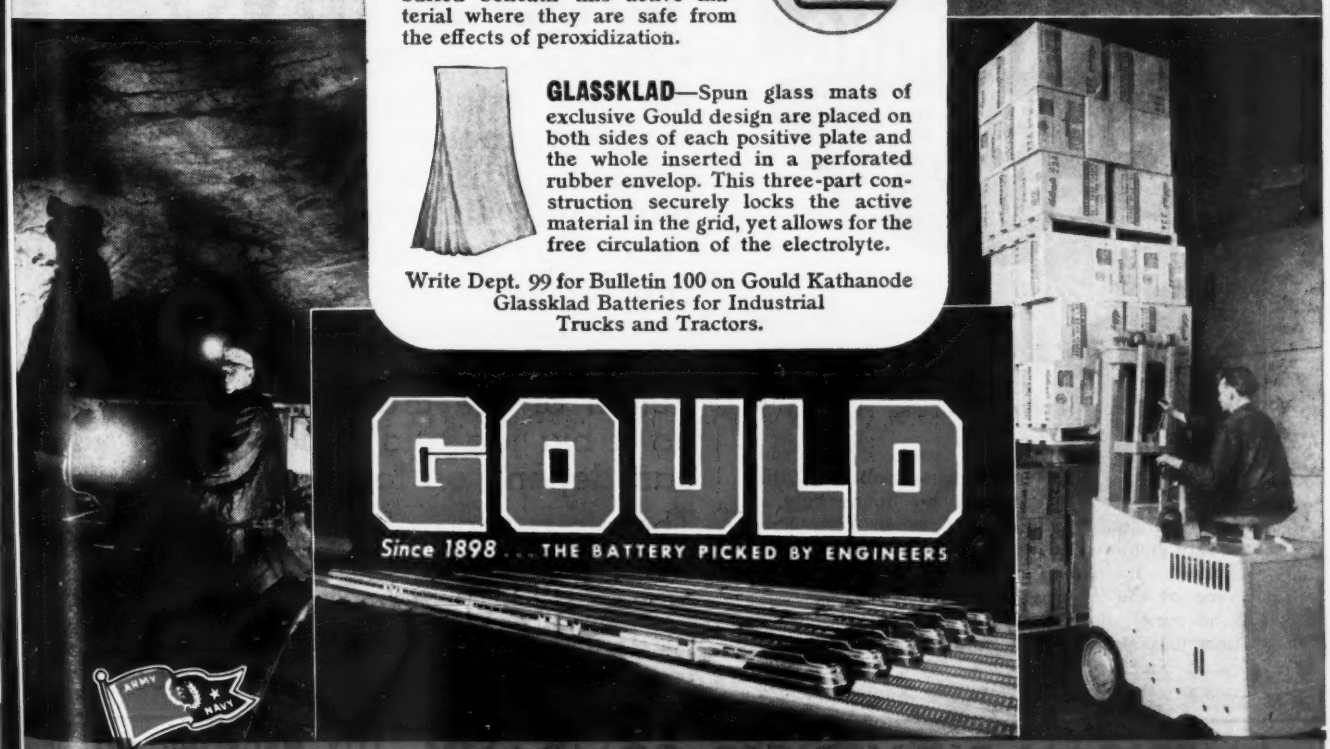


**BLACK OXIDE**—This unique positive active material with the pure lead core maintains a constant volume of active material throughout the life of the battery.

**KATHANODE GRID**—Grid members are of special double-wedge design to create box-like pockets that hold the active material in place. Central reinforcing rods are buried beneath this active material where they are safe from the effects of peroxidization.

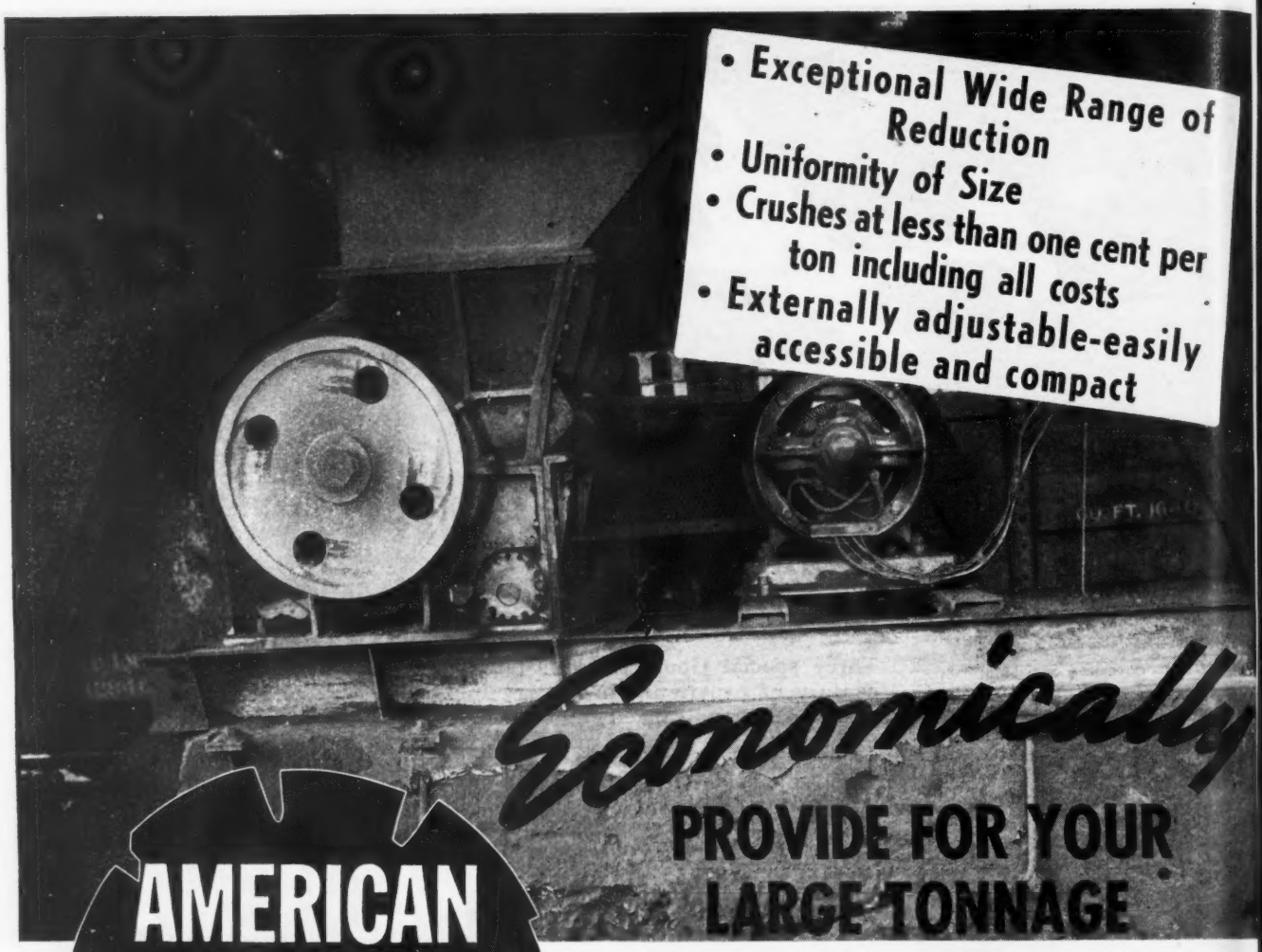
**GLASSKLAD**—Spun glass mats of exclusive Gould design are placed on both sides of each positive plate and the whole inserted in a perforated rubber envelop. This three-part construction securely locks the active material in the grid, yet allows for the free circulation of the electrolyte.

Write Dept. 99 for Bulletin 100 on Gould Kathanode Glassklad Batteries for Industrial Trucks and Tractors.




*For Excellence in storage battery production at Depew plant*

GOULD STORAGE BATTERY CORPORATION, Depew, New York. Factories: Atlanta • Chicago • Dallas • Depew • Leavenworth
Los Angeles • North Bergen • Rock Island • St. Paul • Sioux City • Zanesville


• Exceptional Wide Range of Reduction
• Uniformity of Size
• Crushes at less than one cent per ton including all costs
• Externally adjustable-easily accessible and compact
Economically
PROVIDE FOR YOUR LARGE TONNAGE

# AMERICAN *Type "S"* ROLLING RING CRUSHER

• The splitting action of the SHREDDED RINGS shatters and distributes the coal before it reaches the Breaker and Grinding Plates.

These patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. They have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at the specified speeds. In contact with solid metal, the rings are momentarily deflected from their usual course because they are free to swing back out of position. There are no shear pins or other safety devices that require attention.

## CRUSHING • • •

• The American Rolling Ring Crusher not only establishes high daily tonnage production of stoker and pulverized coals in uniform sizes, but maintains the quantity output day after day at extremely low cost. Among the reasons for this is the ability of this crusher to keep going with hardly a maintainance need and the action of the crushing parts which do a big job and which action you can depend on for top results.

There's a type of unit to fully meet your needs. To find out about this, write us and tell us your crushing requirements. We make recommendations based on long experience.

**AMERICAN PULVERIZER COMPANY** 1119 MACKLIND AVENUE ST. LOUIS, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

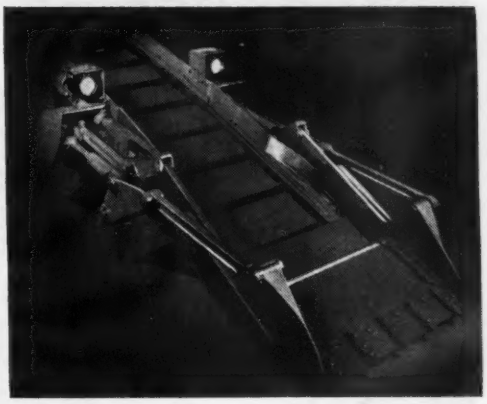
# The 2 Vital Functions of a Mechanical Loader

★ When you choose a loading machine don't overlook the two vital things that make a loader successful — the loading and discharge ends.

If the loading end will produce the high tonnage you demand . . . if you want your coal picked up with a smooth, easy, vertical action, and no crushing . . . if you want it to load any lump that will pass through your tipple, and if you want a loader that will clean up to the pavement without taking soft bottom, then you'll need a Whaley "Automat". And, with it, you'll get a discharge conveyor that's wide and smoothly running. You'll get a conveyor that remains level and parallel to the track at all elevations, which, with its quick vertical adjustment, makes it possible to take full advantage of seam height.

You'll find the "Automat" *is the only loading machine with an automatic shovel and a parallel lift rear conveyor.* This machine is equipped with only one motor—25 H.P., power consumption only 1/5 KWH per ton of material loaded.

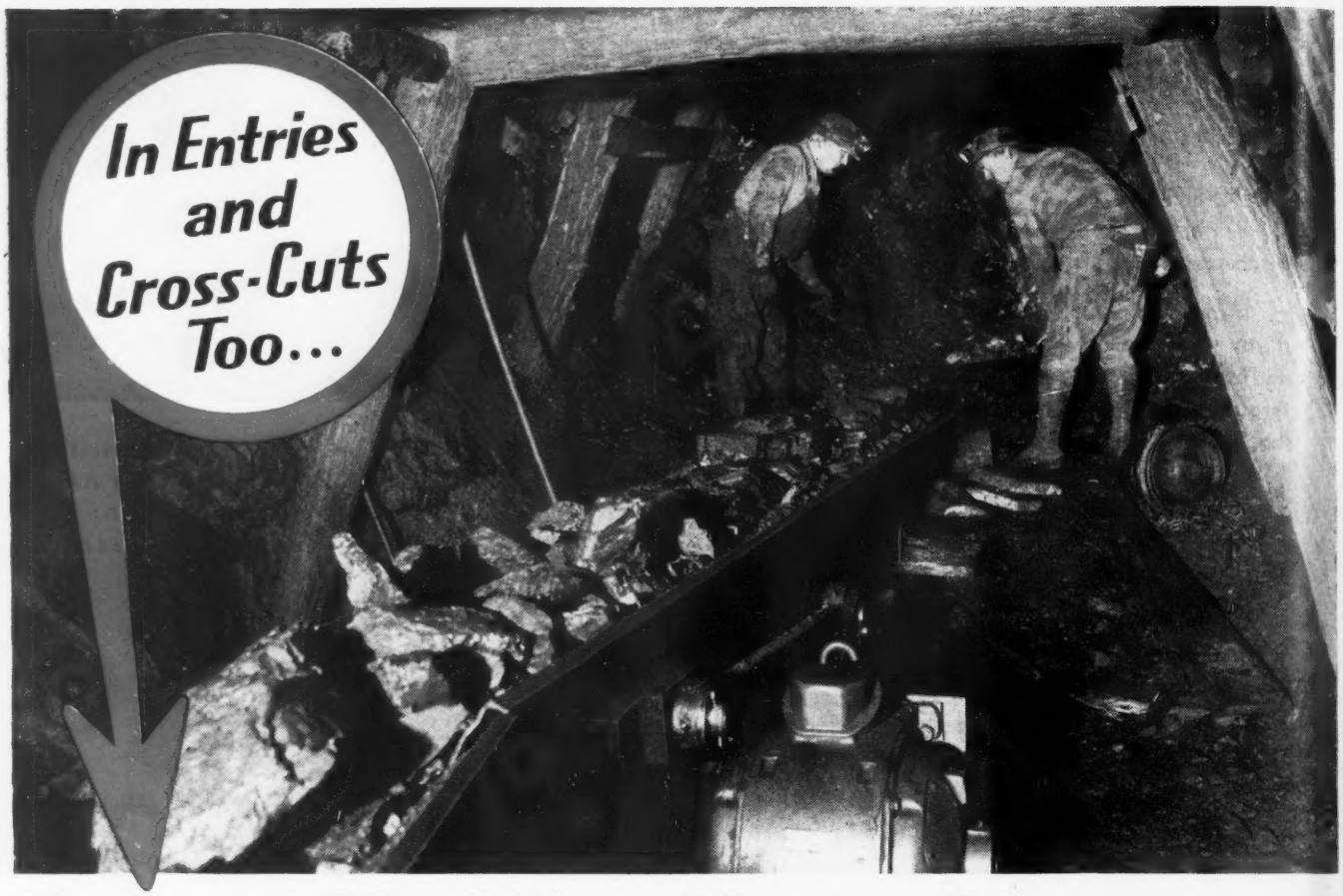
If you expect to equip with loading machines you should investigate the Whaley "Automat" now. Myers-Whaley Company, Knoxville 6, Tennessee.



***The loader with the natural, smooth, easy, shovel action loading head.***

## ★ MYERS-WHALEY

***Mechanical Loaders Exclusively for Over 36 Years***

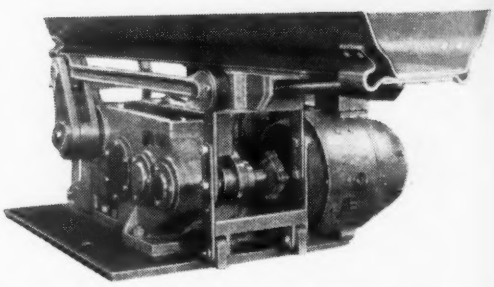



# Vulcan Shaking-Chute Conveyors

## Cut Labor Costs and Boost Production

Modern applications of Vulcan Shaking-Chute Conveyors not only eliminate the back-breaking drudgery of loading coal into mine cars from rooms and long-wall working faces, but also in entries, cross-cuts and headings. Many ingenious and effective methods have been developed by Vulcan Engineers—some of which are only possible with Vulcan equipment.

Write us regarding any coal or rock handling requirements. We manufacture not only shaking-chute conveyors, but also a complete line of underground chain conveyors and scraper loaders, so that our engineers can afford to be absolutely impartial in their recommendations. No charge, or obligation of any kind, for constructive suggestions and estimates.



Vulcan Shaking-Chute Conveyor Drives are manufactured in several types and sizes for operation by motors ranging from 5 to 35 hp. We also manufacture a complete line of chutes, rollers, screw-jacks and other accessory equipment. Bulletins on request.

## VULCAN IRON WORKS

Established 1849

**Main Office and Works WILKES-BARRE, PA., New York Office 50 Church St.**

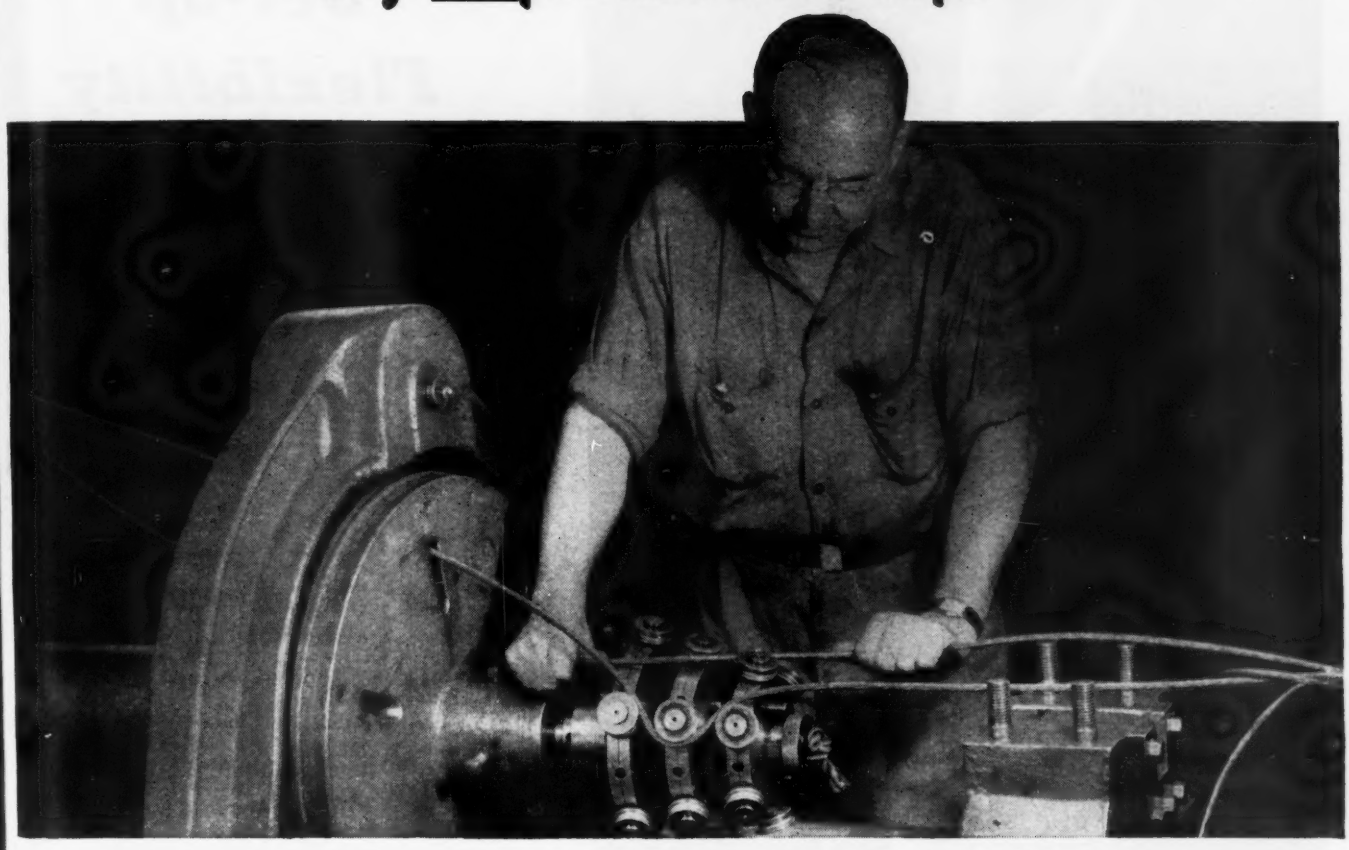
Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushers and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

# "I've been 'setting up' Preformed ever since there was any Preformed Wire Rope"



"SETTING UP" is the initial step in manufacture which determines the final quality of Preformed Wire Rope.

Each and every strand of wire must be accurately and exactly pre-shaped on the preforming head the way it is to 'lay' in the rope. In this way added strength and life are built right into the heart of the rope. A mistake here could result in "heart failure" and irreparably bad performance.

It takes hands with the "feel" for setting up to do this exacting job . . . hands like Frank Mayer's which have been making Preformed for more than twenty years—in fact, ever since the birth of Preformed.

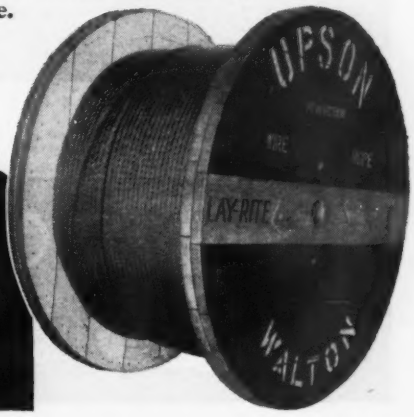
One reason you can always depend upon Upson-Walton LAYRITE Preformed Wire Rope is that every single foot of it is a *hand* controlled rope..controlled by the most experienced hands in the business.

It always pays to specify LAYRITE Preformed made by Upson-Walton — because LAYRITE is "set up" with consummate skill born of experience, for which there is never any satisfactory substitute.

U-W

Established 1871

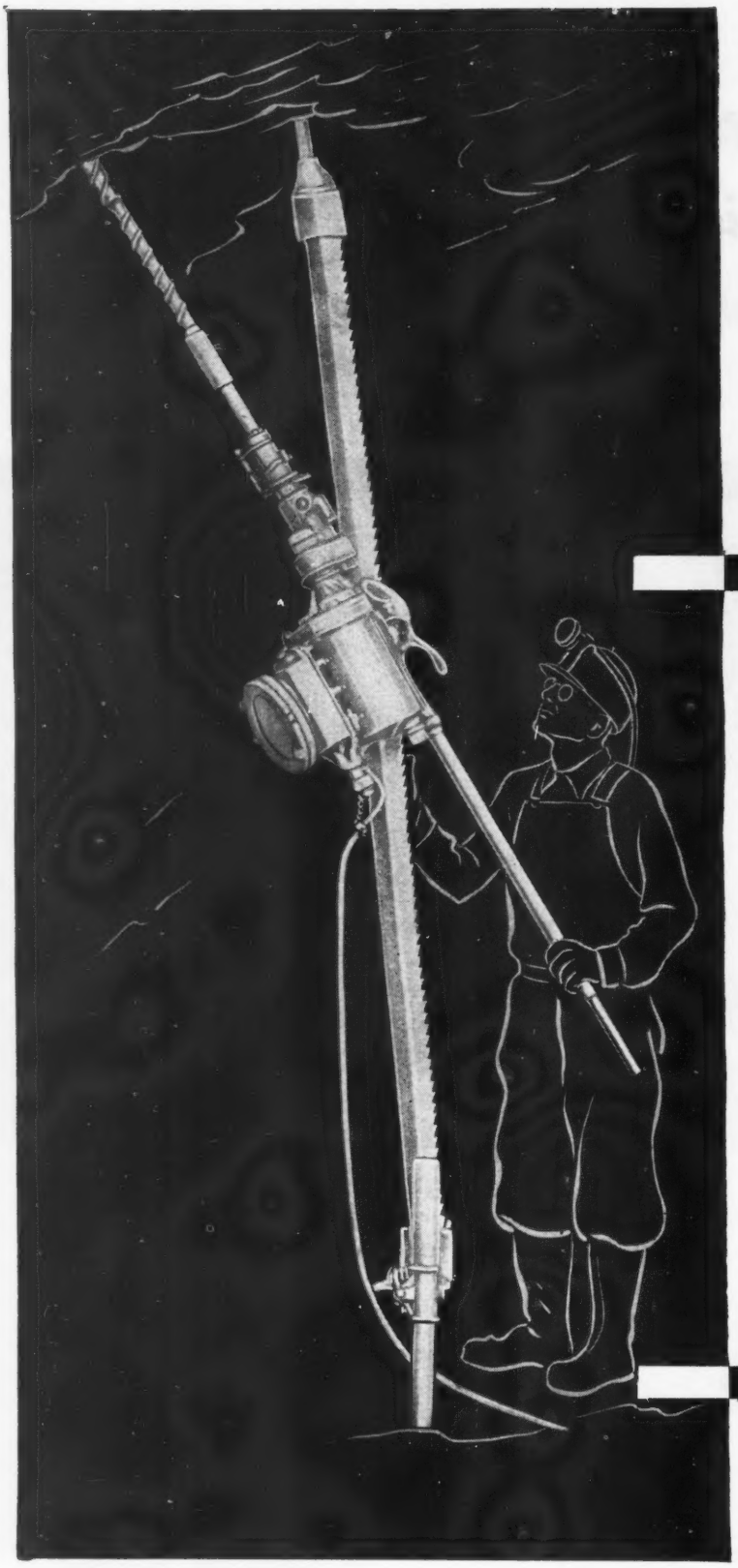
*Upson-Walton also manufactures wire rope clips, thimbles and sockets; tackle blocks, snatch blocks, turnbuckles and shackles*




## THE UPSON-WALTON COMPANY

*Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks*

NEW YORK • PITTSBURGH • CLEVELAND • BUFFALO • CHICAGO



# Post-Mounted Set-up Flexibility

## CP ELECTRIC COAL DRILLS

THIS CP No. 574 Permissible Electric Coal Drill is typical of one of the various possible combinations for making up a complete drill assembly. CP furnishes these drills on the basis of combinations of motor, hookup, post, boot, clutch, boxing, thread bar, auger and cutter heads to meet your specific drilling conditions. For full information write for Catalog 901.

CP manufactures the largest line of Electric Coal Drills: four sizes of the Post-Mounted type, five sizes of the Hand-Held models.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

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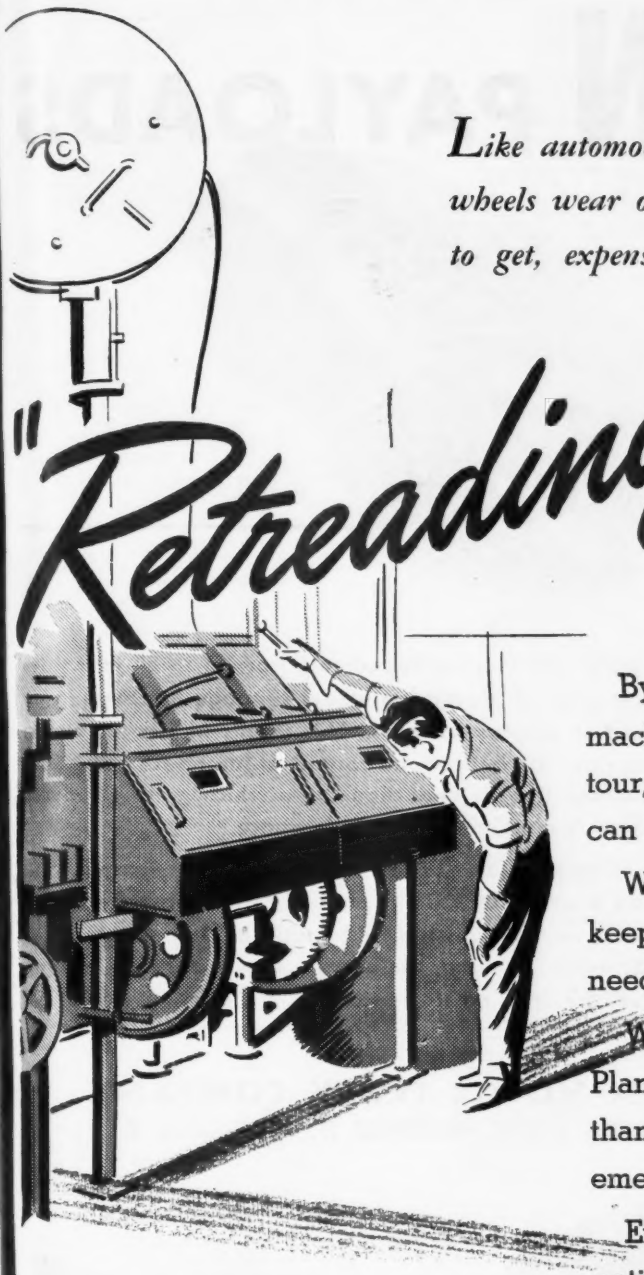
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

*Like automobile tires, mine locomotive wheels wear out. New wheels are hard to get, expensive, require critical steel.*

# "Retreading" ... WITH STEEL



By welding layers of steel to the worn wheel, then machining this "retread" to the standard tire contour, badly worn locomotive tires—and axles too—can be reclaimed.

Wartime steel shortages, and the pressing need to keep equipment running, has greatly increased the need for this maintenance service.

Westinghouse District *Manufacturing & Repair** Plants in the nation's coal mining areas have more than doubled their facilities for handling this vital emergency service.

Every Westinghouse M & R Plant is a part of a nationwide service organization—with local branches as close as your telephone. Factory trained men, using factory methods and equipment, are ready to give you complete, dependable repair service on any type of electrical equipment. J-90501A

*When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for*

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**COMPLETE REPAIR SERVICE**

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# HAUL 60 TON PAYLOADS

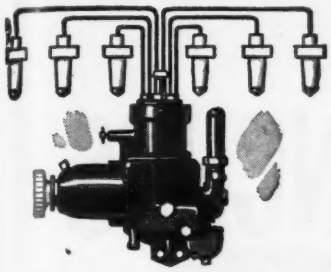
## —without ruining roads or tires!

As shovels move farther and farther from your plant, the problem of supplying coal to the plant becomes more acute. High-tonnage hauling with Walter Tractor Trucks is the answer! These powerful, specially-designed trucks haul 60 tons in two trailer units or 30 tons in single trailer units—fast, safely, economically. Fewer Walter units deliver a greater tonnage per day, per driver—reducing hauling costs and making maximum use of limited manpower.

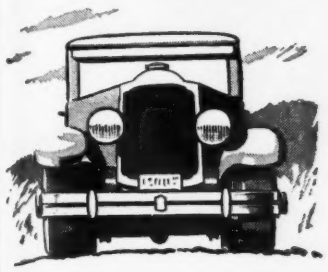
Despite the huge loads, Walter Tractor Trucks are easy on your roads and tires. The exclusive Four-Point Positive Drive provides smooth traction to all four driving wheels, preventing wheel slippage or spinning on soft or slippery surfaces. This results in less tire wear, as does the better road contact obtained from the Suspended Double Reduction Drive which greatly reduces unsprung weight and wheel bounce.

Other features of this advanced Walter Tractor Truck are a powerful 300 h.p. motor (diesel or butane), tractor type transmission, automatic locking differentials, hydraulic steering, air brakes, engine forward design. Get the detailed story—today. Write for literature.

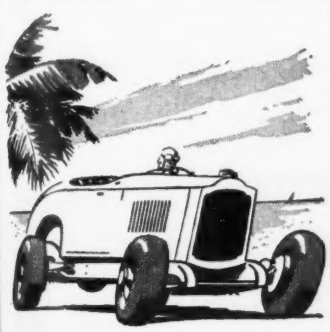
**WALTER MOTOR TRUCK COMPANY**
**1001-19 IRVING AVENUE, RIDGEWOOD 27, QUEENS, L. I., N. Y.**



*Dependable* diesels are not built in a day. For instance, in perfecting the *exclusive* Cummins Fuel System, now an accepted model of simplicity and efficiency, 3,000 different injection mechanisms were developed and tested between 1923 and 1927 before Cummins engineers were satisfied. Insistence on "making it right," regardless of cost, explains why Cummins Diesels are known everywhere as *the dependable diesel.*



A Cummins-powered Packard sedan was the world's first diesel-propelled automotive vehicle. Driven in 1930 from Columbus, Ind., to New York City by designer-president C. L. Cummins at a fuel cost of only $1.38, the car was barred from the New York Auto Show and, later, the Atlantic City Road Show. Today, Cummins Diesels are found in practically all leading makes of heavy-duty trucks and construction equipment.



In 1930, under AAA sanction, the world's first official record for diesel-powered vehicles was established at Daytona Beach, Florida, by a Cummins Diesel installed in a Packard roadster—83 mph. The engine was a "dolled up" Model U designed for marine service. Although built to operate at 800 rpm., it was revved up as high as 1900 rpm. during the run, without any difficulties developing.

**CUMMINS DEPENDABLE DIESELS**

*Automotive Models:* Designed for all types of heavy-duty trucks in either highway or off-the-highway service.

★ ★ ★

*Industrial Models:* Portable and stationary engines, power units, and generating sets for service in any industry requiring heavy-duty power.

★ ★ ★

*Marine Models:* Propulsion engines and marine type generating sets designed for all types of fishing boats, work boats, and pleasure craft.

# Makers and Breakers of Precedents in Power

In the early 20's, most authorities conceded 600 rpm. to be "tops" for a diesel. Cummins conceded nothing—bumped the Cummins Diesel of that early day up to 900 rpm. and kept right on bumping. That's how the modern, high speed diesel was created . . . by making and breaking one precedent after another . . . by doing things in design, construction and metallurgy "that couldn't be done." As a result, today's high speed Cummins Dependable Diesels are doing tough, heavy-duty jobs scarcely dreamed of twenty, or even ten, years ago. Not only doing them, but doing them cheaper, better and faster than they were ever done before. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

# WALWORTH PIPE WRENCHES

**THE WALCO PIPE WRENCH**

**Made to Federal Specifications GGG-W-651a**

**For Type II Heavy Duty Adjustable Pipe Wrenches**

The world's strongest pipe wrench. Equipped with renewable lower jaw. Has only six parts—all forged steel. Sizes 6" to 48".

**THE WALWORTH GENUINE STILLSON**

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**For Type I Normal Duty Adjustable Pipe Wrenches**

Known throughout the world as the handiest tool in the pipe fitter's kit. Sizes 6" to 48".

**THE WALWORTH PARMELEE**

**Made to Federal Specifications GGG-W-651a**

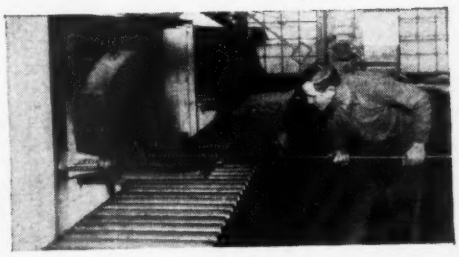
**For Type IV Girth Pipe Wrenches**

No teeth – grips like a human hand. Won't scratch or mar brass pipe. Particularly useful in making up coils. Made in 4 sizes for 3/8" to 4" I.P.S. Girths in special O.D. sizes available.

These three types of pipe wrenches are manufactured by the Walworth Company, and are noted for their safety, strength, and simplicity of operation.

Walworth, with more than a century of "know-how," also manufactures a complete line of valves, fittings, and pipe. For details see your Walworth distributor, or write on your company letterhead for free copy of Catalog 42.

## METALLURGICALLY MODERNIZED



The most advanced metallurgical procedures are employed in the manufacture of Walworth Pipe Wrenches. Forging, heat-treating, and machining operations are performed with modern production equipment under strict supervision. In this way Walworth maintains the high standards of quality that have made Walworth pipe wrenches famous throughout the world.

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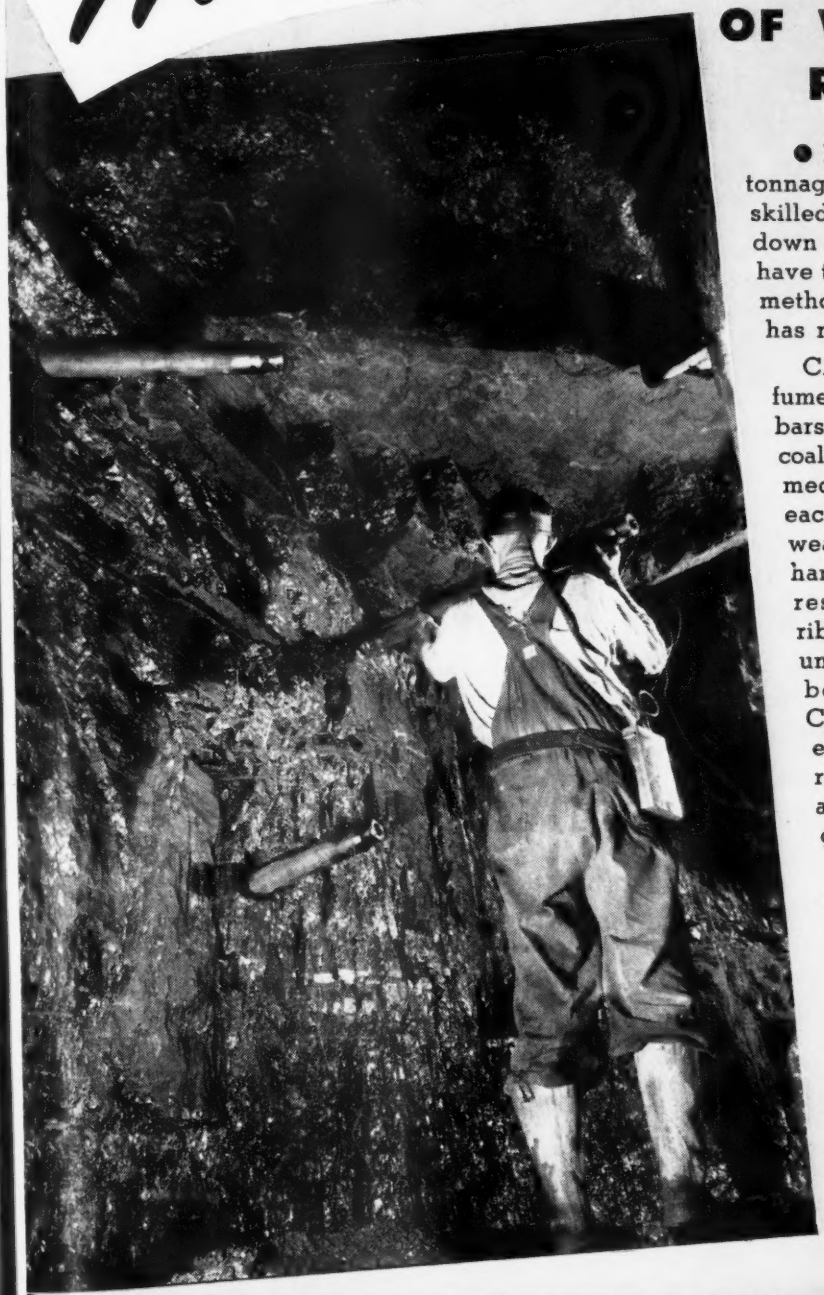
# CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

## *Meets the Challenge*

## OF WARTIME MINING REQUIREMENTS



● Faced with the Nation's need for more tonnage, the problem of an acute shortage of skilled labor, and the necessity for holding down production costs, many mine operators have turned to CARDOX for a more efficient method of dislodging coal. And CARDOX has met this challenge!

CARDOX produces no smoke or noxious fumes. It permits the use of longer cutter bars. Its slow heaving action rolls out the coal for quick, economical loading . . . keeps mechanical loaders productive more hours each shift. CARDOX-mined coal is not weakened by shatter-cracks. This reduces handling, shipping and storage losses resulting from degradation. Roof and rib hazards . . . responsible for 51% of underground fatalities . . . are decreased because of the mild action of the CARDOX discharge . . . also make excellent fire extinguishers. The net result of this combination of CARDOX advantages is more tonnage . . . with greater economy and safety.

Write for details on free test of CARDOX in your own mine.

**CARDOX HARDSOCG DRILLING EQUIPMENT**

Complete line of drilling equipment designed to give you the maximum in drilling efficiency.

**CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS**

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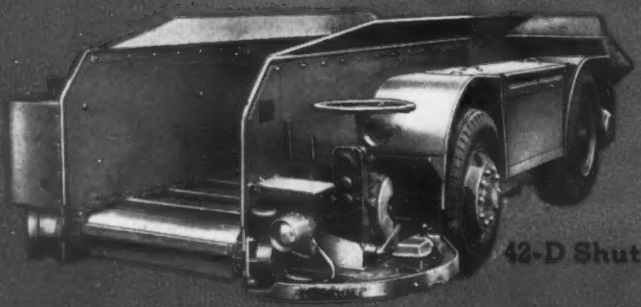
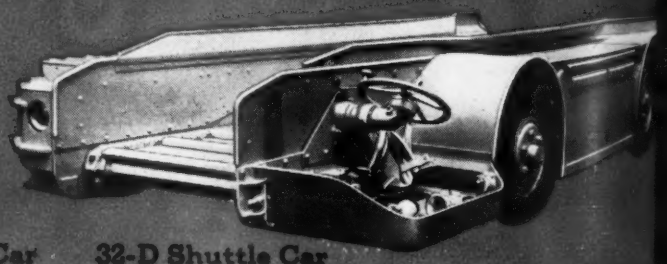
SHUTTLE CARS



42-D Shuttle Car



32-D Shuttle Car

# Those Tonnage Curves Upward

## TALK WITH A JOY ENGINEER

When you've strained all of your facilities to capacity in getting out that last extra ton . . . when manpower shortage troubles you . . . when old equipment has taken its last patch and begins to break down completely under the strain of continuous use . . . that's when you should call in a JOY engineer. For this specialist in mechanized mining operations often can be of tremendous help in solving difficult production problems. Our case records contain many such instances where red ink has been changed to black on the books and frowns of production worry have disappeared in smiles of satisfaction when the month's totals were charted upward.

**JOY mechanization speeds output!**

Logically, systematized quantity operations . . . streamlined mechanized mining . . . will give more production than horse-and-buggy methods.

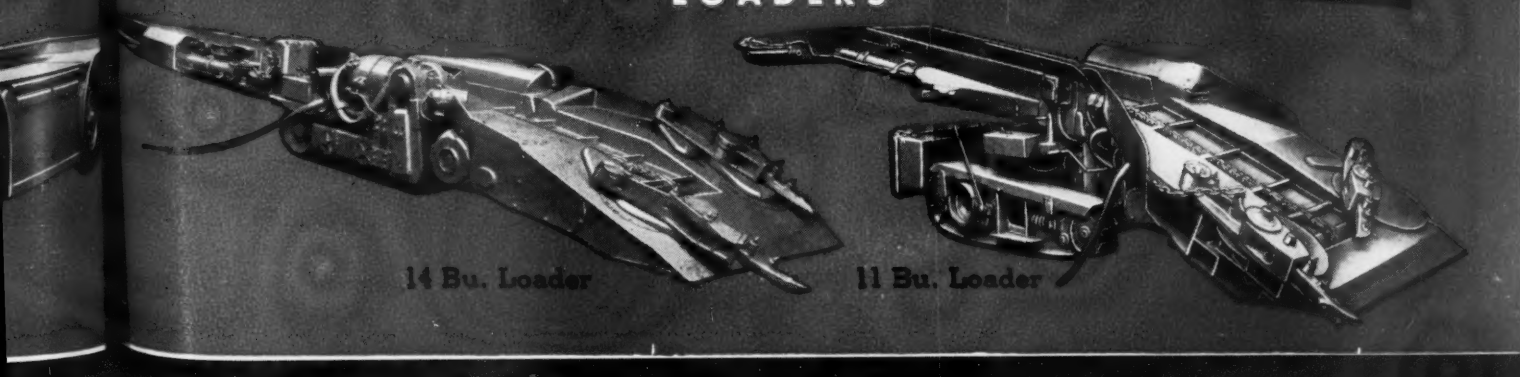
**JOY mechanization lowers costs!**

Mass production and mass marketing are big cost-lowering factors in mining today. Machines pay for themselves many times over in increased output . . . and workers are happier, too.

**JOY mechanized units give longer wear at lower upkeep cost.**

**JOY MANUFACTURING CO., FRANKLIN, PA.**

LOADERS



14 Bu. Loader

11 Bu. Loader

# CRESCENT BRAND

## *A Favorite for Many Years*

For many years this famous brand has been a favorite for underground work, being very popular in large mining districts. The fuse is white, giving high visibility; waterproof and therefore suitable for use in very wet work; flexible — and its burning qualities make it ideal for use in long holes and large rounds. The fuse is reinforced with cotton threads wound spirally, and finished with a clean, hard white coat.

Perhaps Crescent is the brand *best suited* to your needs. The Explosives Company supplying your requirements will be glad to discuss this subject with you — or you can write us.

Are you using the brand of Ensign-Bickford Safety Fuse best suited for your work? For instance:

| *If you have . . .* | *and now use . .* | *we suggest* |
|---|---|---|
| Very wet work | Double Tape<br>Single Tape<br>White Clover<br>Beaver | Orange Wax Clover |
| Very wet work | Crescent | This is O.K. |
| Very wet work | Gray Charter Oak | Black Wax Charter Oak |
| Damp work | White Charter Oak | This is O.K. |

# ENSIGN-BICKFORD *Safety Fuse*

SINCE 1836
Also Primacord-Bickford Detonating Fuse

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT

# Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

**Ivan A. Given, *Editor***

**September, 1944**

## No Benefit

THE LATEST attempt of the United Mine Workers, through a subsidiary of District 50, to organize supervisors at coal mines does not alter the fundamental facts in the situation. Bosses still are a part of management and any attempt to split them out can result in nothing but increased difficulty in assuring the maximum cooperation and efficiency so vital in providing maximum benefits to men, management, stockholders and, last but not least, coal's customers.

The effects of forcing bosses into the same union as workers are plain and they are not necessarily encroachment on the workers' rights as seen by the National Labor Relations Board in various decisions on foremen's unions. Rather, the bosses would take their cue from the men and the result would be a direct invasion of managerial functions at perhaps the most critical level. As an earnest of things to come, coal already is being treated to the spectacle of strikes by miners to force recognition of the foremen's union, as well as strikes because foremen have refused to organize. There is no reason to believe that if the present campaign is successful the miners will expect anything else but obedience to their wishes from brother members of the union.

Some people, outside the industry, ask: Why should it not be possible to function with unionized bosses, even when they belong to the same union as the men? Anything, of course, can be made to function if the cost is not counted. In the last analysis, organization of bosses turns on two questions. The first is: Will it benefit the industry? The answer is no. Organization of bosses destroys the efficient management teamwork so necessary for progress. The second is: Will it benefit the boss himself? Again the answer is no. A union—any union—can offer the boss nothing but regimentation to a dead level and curtailment of opportunities for advancement.

## Proof of the Pudding

"THE PROOF of the pudding," so the old saying goes, "is in the eating." Likewise, the proof of coal research is the results it gets. That it can get results is witnessed by the latest development in heating with anthracite to come out of the laboratory of Anthracite Industries, Inc. This development, summarized in the news section of this issue, promises real benefits for anthracite in the future. Like many other outstanding research products, it is the result of long-continued and painstaking study of the industry's product and how it can be used.

Research succeeds because it takes nothing for granted. There is nothing mysterious about it and it requires nothing more for its success than money, organization and perseverance. It gets the facts and the facts show not only how existing markets may be retained and expanded but also where the new opportunities exist and how coal can capitalize on them. Anthracite's new heating development is one more piece of evidence that investment in research really pays off.

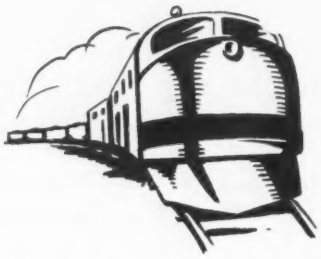
## Not the Last

THE COUNTRY had a narrow and perhaps only temporary escape from further federalization and regimentation of its economic and social life when the Senate recently rejected the Murray-Kilgore bill, described by Arthur Krock, noted commentator on the Washington scene, as a bill "to make unemployment blissful." There is no reason to believe that this will be the last attempt to use the federal taxing and spending powers to buy support for legislative or executive action that is not only unsound economically but would tend to concentrate more and more power over the freedom of the individual in the hands of those who believe that the citizen should serve the State rather than the State the citizen. This philosophy, incidentally, is the essence of dictatorship.

The United States has grown great on efficient low-cost production by men free to act with only the minimum of policing from government necessary to insure fair play. The advocates of the super-state would substitute federal handouts for wages fairly earned, federal taxing and spending for private investment and enterprise and complete government control by a growing body of federal employees for individual initiative and freedom of action. The attempts will continue. Whether they will be successful depends upon how well those interested in guarding our rights and liberties succeed in making themselves heard. It is a job for coal men, too.

# The Iron Horse

## COAL'S BIG MARKET PROBLEM



With the diesel whistle echoing farther and farther throughout the land, what are coal's chances of holding or expanding its share of the locomotive fuel market? Can coal provide the answer to this and other competitive questions? The answer depends upon progressive thinking and generous support of research into improved steam-locomotive design.

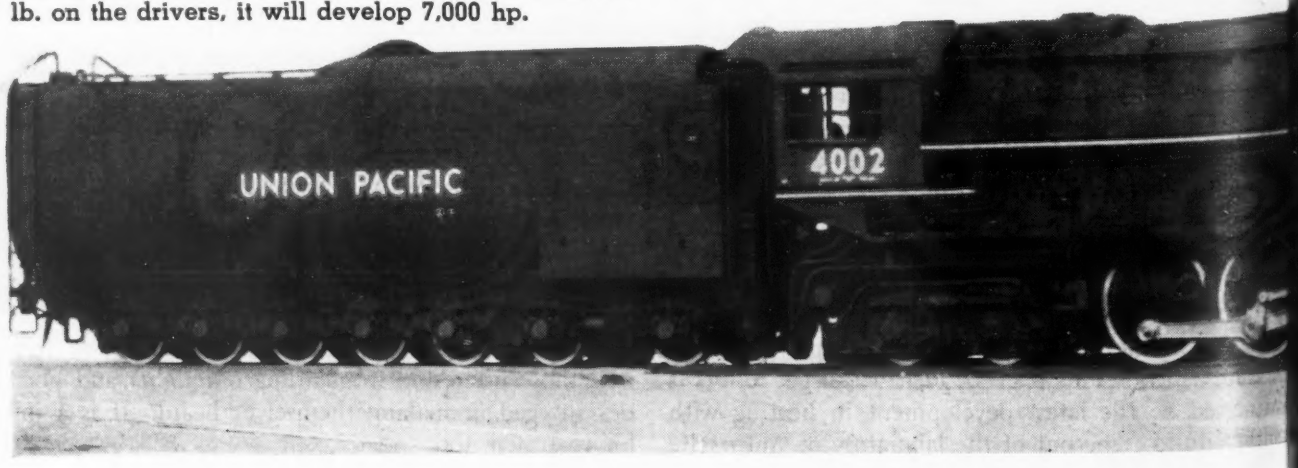
TEN YEARS ago, the Chicago, Burlington & Quincy R.R. and the Union Pacific R.R. unveiled, with appropriate fanfare, the first diesel-powered mainline passenger trains in the United States. There followed several months of exhibition tours, inspection trips and official visitations, and finally in November the Burlington put the first diesel-powered train into revenue service between Lincoln, Omaha and Kansas City.

Coal men smiled and shook their heads, but they did not worry. The diesel, they told one another, would never replace the Iron Horse. When some of the early diesels burned out their motors or limped in on one cylinder, or when regulation air brakes made them quiver like a Sunday driver at a busy intersection, coal men smiled even more knowingly. They were pretty, they allowed, but would they work?

That was in 1934. Today, the diesel horn is almost as familiar a sound on the western prairies—and a lot of eastern mountains—as the steam whistle, and coal men have begun to think. In 1942 there were 1,667 diesel locomotives in service: 1,139 switching, 441 passenger and 87 freight. During 1943, 442 steam locomotives were ordered by Class 1 railroads against 612 diesel, while ten years before only 25 diesels had been ordered. In 1934 there were so few diesels bought or ordered that the American Association of Railroads did not bother to break them down in classification, simply lumping those bought as "electric and others." In 1944, while the Interstate Commerce Commission still does not classify diesel fuel for freight service, one large diesel plant has orders for 154 freight locomotives.

Approximately 20 percent of all bituminous coal mined in the United States is sold to Class 1 railroads. The total was more than 123,000,000 tons, with a value of almost $325,000,000.

**STEAM GIANT—Known affectionately as "Big Boy" by its makers, the American Locomotive Co., this 4-8-8-4 mountain-type locomotive exemplifies the strides in steam design in recent years. With 540,000 lb. on the drivers, it will develop 7,000 hp.**



in 1943. In 1922, coal furnished 91.4 percent of all fuel for Class 1 railroads, while in 1942 and 1943 the proportion had fallen to 82 and 81.8 percent.

Coal men no longer are in a mood to smirk at the diesel. It was not only pretty but, to the chagrin of most and the surprise of many, it worked. Of course, it still has its kinks and there are some places where it has not and probably will never take the place of steam. Furious debate still rages on comparative operating costs, with the figures providing everyone with his own answer. But the payoff is that railroad men are buying more and more diesels. Most are satisfied and the rest are curious. They are the ones who paid for steam locomotives.

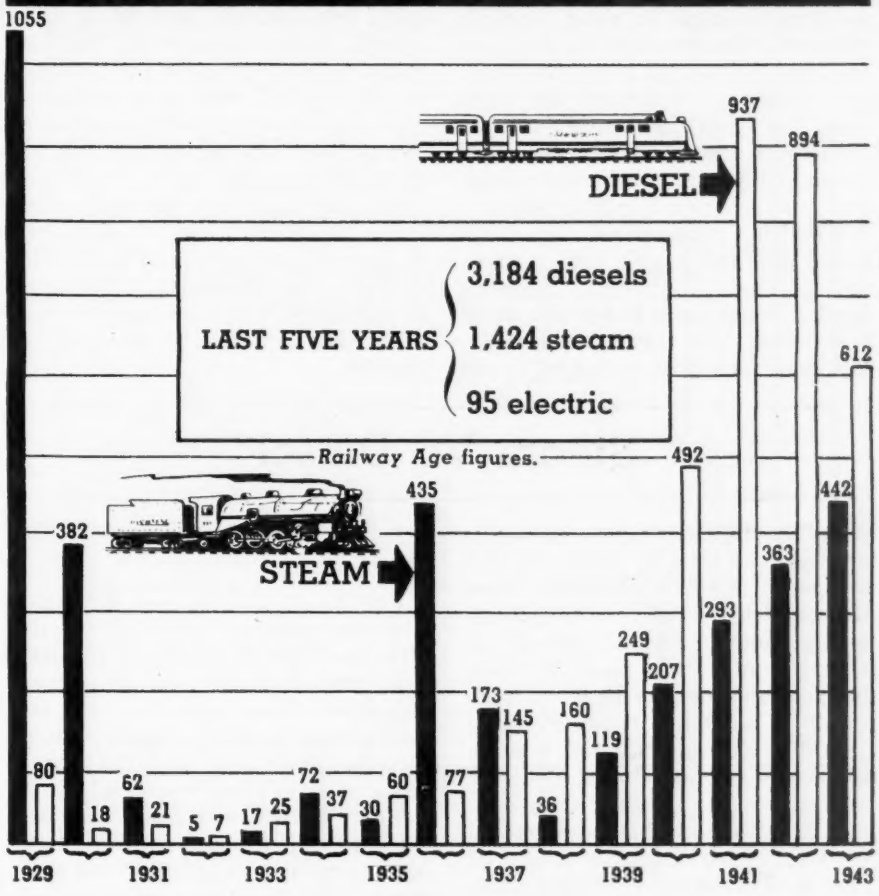
### Two Carriers Choose Diesels

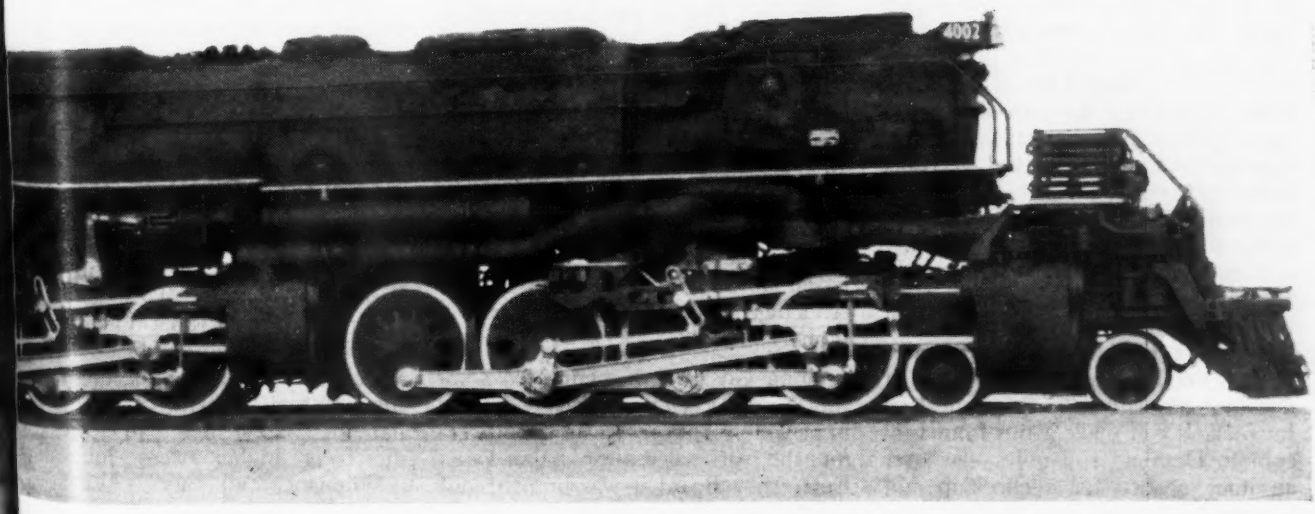
Typical of the trend which railroad executive thinking has taken is the decision by two railroads running through the heart of the anthracite country—the New York, Ontario & Western and the New York, Susquehanna & Western—to completely dieselize their motive power—another example of coal men faced with the prospect of seeing their product hauled to market by oil. The New York Central—as good a coal road as there is in the country—has bought two 5,400-hp. freight diesels "for experimentation." The Erie, running through rich coal fields, has ordered five 5,400-hp. freight engines to break a specific power bottleneck. The Burlington, the Rock Island, the Chicago & Northwestern, the Sante Fe and others are planning expanded diesel purchases presently for freight and later for passenger service when such locomotives are available.

There is no longer any question whether or not there is a trend to the diesel. It is now, in the opinion of many, a question of whether the trend can be stopped. There is, obviously, no danger of coal losing the entire railroad market overnight—or ever, for that matter. There are roads that will continue to use steam and would not be found dead in the same roundhouse with a diesel. Unfortunately, their motive is more one of coal traffic than of relative steam and diesel efficiency. They are the die-hard coal roads. There are places and services where steam will continue to do the work cheaper and more efficiently than diesel power could. There is the matter of millions of dollars invested in the estimated 40,000 steam locomotives now in service. But there is the

## DIESELS TAKE THE LEAD

**From a predominant position in Class 1 railroad orders in 1929, the steam locomotive, after a brief comeback in 1936 and 1937, has trailed the diesel, sometimes by a wide margin, since 1938.**



grave and likely danger that substantial inroads will be made, and are even now being made, into a market which annually takes more than one-fifth the bituminous output.

Fortunately, coal men are recognizing the danger, and many of the more progressive operators have changed their attitude from "Why worry about it?" to "What can we do about it?" Things are under way in the locomotive field. The best technical brains, not only of the coal industry but of coal-carrying railroads and locomotive builders, are directing exhaustive and extensive research into better steam engines. But before discussing what they are doing it might be more pertinent to discuss why they have to do it and why, in the face of many seemingly unfavorable circumstances, the diesel trend has gained momentum.

The first use to which the diesel locomotive was put by American railroads was as a switch engine, and it is as a switcher and terminal engine that it still does the biggest portion of its work today. Locomotive designers assert it is impossible to beat the diesel in switching. The virtue of availability, so widely claimed for the diesel on the road, is underscored in switching work. It can be left on track virtually without attention for days, even weeks, at a time. It is cheaper to operate because it consumes fuel only while it is actually running. It requires no water and does not have to come into the yard for inspection or repair except at rare intervals. Even the most stubborn opponents of the diesel admit it has virtues as a switch engine. But on the road the argument still goes on.

Diesels are expensive. There is just about enough left out of half a million dollars to tip the waiter when a railroad has paid for one 5,400-hp. four-unit freight engine. That is about two and a half times the price of any comparable steam locomotive. The railroads' financial situation has not been so affluent that they were willing to experiment with costly equipment. Why, then, will they invest nearly a half million dollars in a diesel unit when they could get two and a half steam locomotives each of which can do approximately the same work? The answer is that the diesel, according to its supporters, does more than two and a half times the work and does it cheaper.

## Steam Vs. Diesel

What are the facts about diesel locomotives, or at least the arguments pro and con? The following material summarizes what railroad operating executives, locomotive designers and motive power engineers told *Coal Age* were the diesel's virtues. With it, for comparison, is what fuel engineers, other railroad executives and coal research technicians said in rebuttal.

AVAILABILITY: This is argument No. 1 for diesel locomotive power. It is not at all uncommon for diesel mainliners in the Middle and Far West to run 16 to 18 hours a day seven days a week. No steam locomotive, either on the rails or on a drafting board, can come close to that. One of the Rock Island's Rockets had an advertised record of 99.8 percent availability over a period not of months but of years. Such mileage records, of course, put an entirely different light on the investment cost. The diesel's availability is brought about by the fact it does not require boiler cleaning or inspection; it does not have to go to the roundhouse for attention or minor repairs; it does not have to stop for water; it does not have to make frequent stops for fuel. It can make a run from Lincoln to Denver—500 miles—lay over an hour or two for a check-up and start back. It can, if necessary, run 24 hours a day seven days a week.

REBUTTAL: Coal men say the diesel advocates confuse availability with utilization; that 95 percent availability is no good if you get only 50 percent utilization. Diesel runs, they say, are hand-picked to get maximum utilization. Let them, they say further, try a diesel on a run where the round trip is 100 to 200 miles and where traffic does not require more than one trip a day, and see what mileage they can get. Hand-picked diesel runs are compared with steam's over-all schedule and naturally look better, steam men declare. But in addition to that, railroad management has only recently learned that the steam locomotive need not be pampered. In the words of one fuel engineer, "you should never let it cool off." So steam, because of this realization, improved maintenance practices, pretreated water to lessen boiler cleaning and repair and larger grates to lessen burning rates and thus reduce servicing, has achieved greater utilization.

FUEL COST: Argument No. 2 for the diesel. Fuel costs vary according to geography, but in the arguments before the National Railway Labor Panel Emergency Board it was brought out that the Sante Fe, running through oil country, listed diesel fuel costs at $0.1738 per locomotive mile, and steam costs at $0.1828. On the other hand, fuel-oil costs will vary from as much as 12.7c. a gallon in Maine to 3.84c. in the Southwest. Diesel users allege, and their operating figures show, a reduction not only in the cost of fuel but in fuel handling. They also claim at least a corollary saving in uniformity of product.

REBUTTAL: On price, coal men say, there is too much geographical variance to make any hard and fast statements, but that nevertheless coal is costing some railroads, notably in Illinois, less than $2 a ton. They cite as typical, however, the costs on a road from the East to Chicago of oil at 6.09c. a gallon and coal at $2.52 a ton. They point out, too, that the comparison is between diesels, none of which is more than 10 years old, and steamers, many of which are more than 25 years old. They claim handling costs cannot be materially reduced unless an entire subdivision or an entire road is dieselized.

WATER: The diesel does not have to worry about taking on water or, when running through desert area, about its availability. The cost item, therefore, is eliminated. In addition, not having to take on water is a time saver.

REBUTTAL: Steam champions say that while almost every item connected with serving the steam locomotive has improved in the last 25 years, it still takes on water the same way. The only significant improvement has been the track pan, and that is practical only where the road bed is straight and level. This, they say, is not the fault of the locomotive. They point out that a steam locomotive can take on a tender load of 20 tons of coal in three minutes; that water could be taken on much faster with better methods.

OVER-ALL OPERATING COSTS: A touchy subject because the figures can be made to show almost anything. In the Santa Fe case, the over-all comparison between steam and diesel showed $0.6803 for steam and $0.8121 for diesel per locomotive mile. One western road said it has saved $32.17 a day, $978.05 a month, and $11,742 a year on a run in which it had replaced a 4-8-4 steam locotomive with a 4,000-hp. diesel. This same road said its over-all costs per mile had been $0.4853 for steam and $0.4270 for diesel, with saving for the diesel coming in fuel, water, sand and fuel handling. Cost items in which the diesel is higher were lubrication, maintenance and wages. Also figured

in operating costs, obviously, was the greater mileage compiled by diesel equipment.

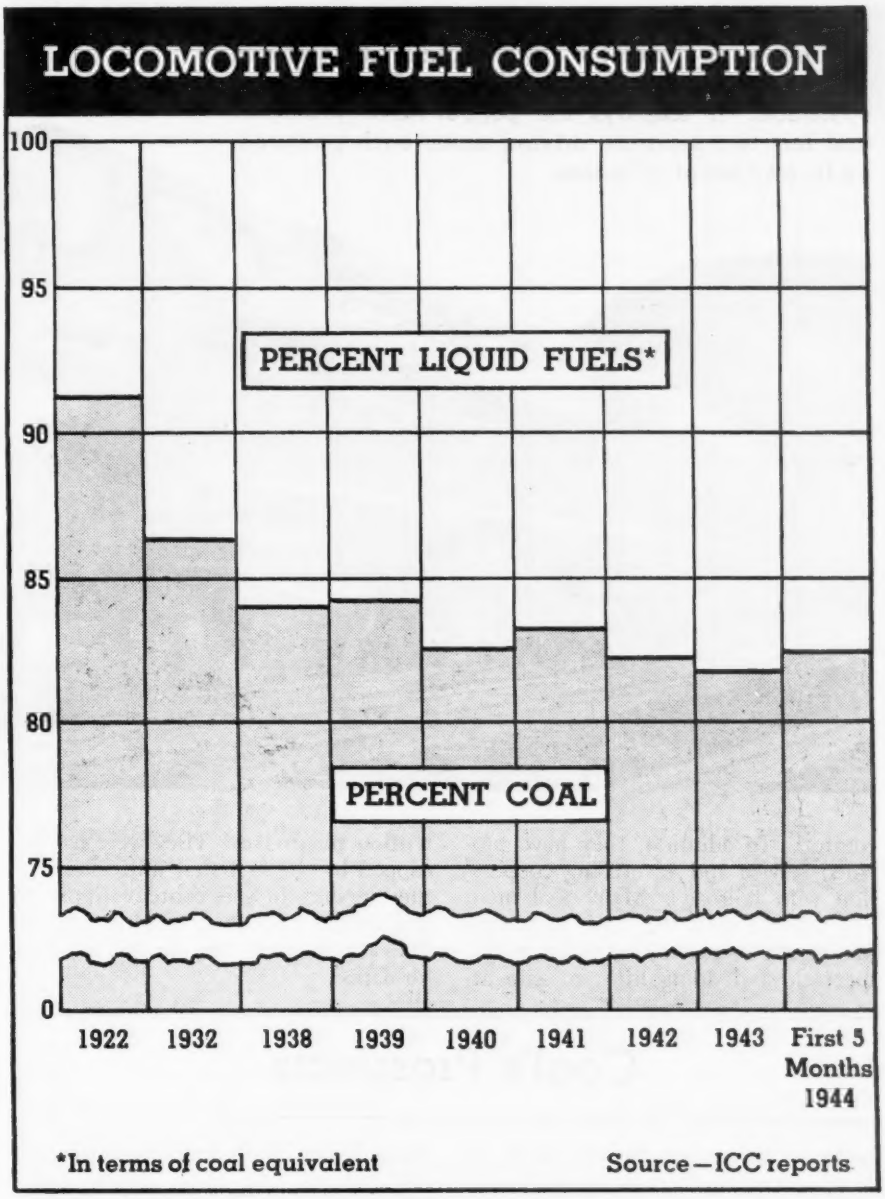
REBUTTAL: Coal men do not attempt to dispute individual company figures. They assert, however, that as diesel equipment gets older its maintenance costs will increase. They advance this theory: operating-cost figures on diesels cover a period of about eight years. That means that most diesels are comparatively new. Operating-cost figures of steam locomotives include every locomotive in service, and many have been hauled out of storage and placed in operating condition because of wartime demands. Steam-locomotive figures show that as of Jan. 1, 1943, 3.1 percent of all engines in service were one to eight years old, 2.4 percent were 9 to 13 years old, and only 15.8 percent were 18 years old or less. In those 18 years many advancements have been made in efficiency and utilization, but modern locomotives have to be averaged with the old ones. For instance, one railroad man figured out that if all steam locomotives now in service were modern and were efficiently operated, the saving in coal alone would be 33,000,000 tons a year.

SMOKE AND NOISE: These two factors are growing more important almost daily. The diesel offers no smoke problem. It is a quieter locomotive than steam.

REBUTTAL: The overfire air jet for steam locomotives has been tested and proved an efficient smoke eliminator. It needs only to be generally applied. One railroad executive, who uses both diesels and steam, said that on successive days he had complaints from residents on the right-of-way, first about steam exhaust, next about diesel hum. There is no such animal as a silent train; at least yet.

POWER: Theoretically, a diesel could be strung in successive units from New York to Chicago, so its power potential is almost unlimited. Practically by adding units a diesel locomotive can increase power without a corresponding increase in clearances. Diesel parts are lighter and no tender or water compartment is necessary. The diesel delivers an even flow of power, eliminates jerky starts, can apply its power all at once so that it can walk off with 125 loaded freight cars, and eliminates pound on rails—a substantial item in railroad maintenance.

REBUTTAL: When the going is tough is when steam comes through.



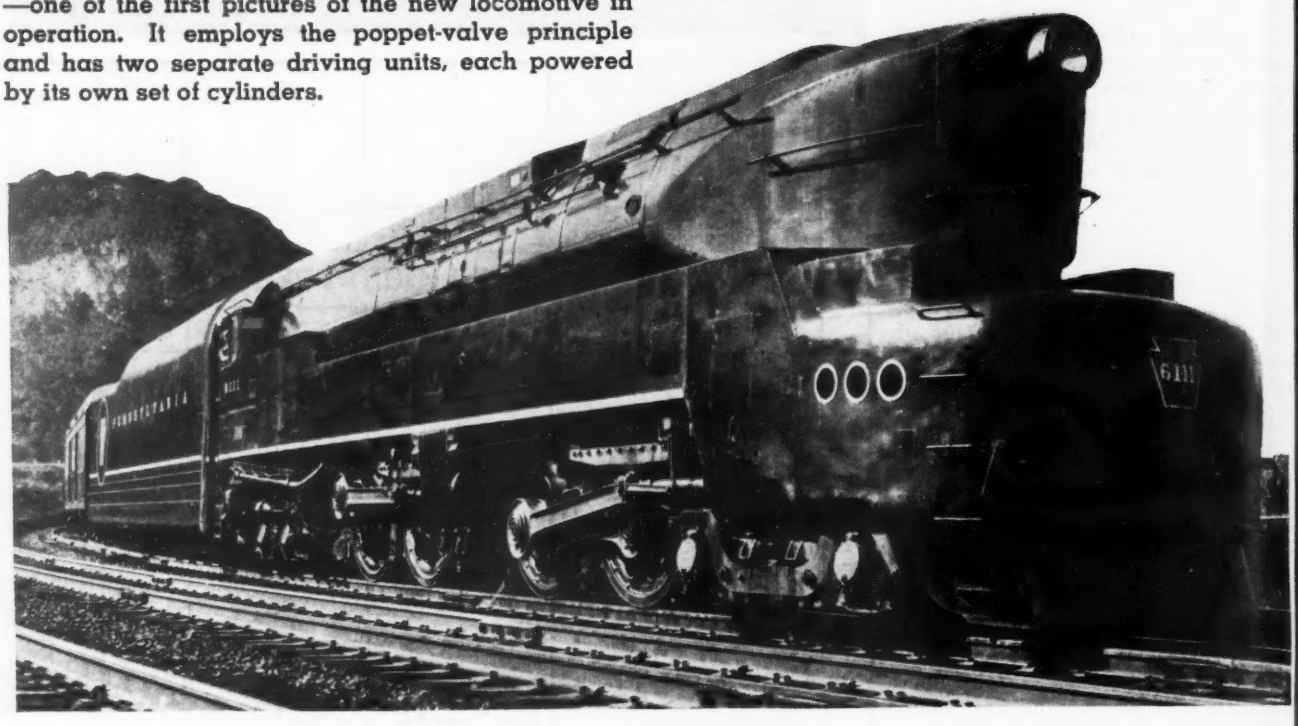

**OIL TIDE—Liquid fuels steadily increase their share of the locomotive fuel market, with corresponding losses for coal. The surge to diesels is a growing factor in late years.**

Steam can deliver extra power when it's needed, as in the face of adverse weather conditions. Steam is more effective at high speeds than diesel, accelerates faster from 35 m.p.h. up. Besides, it also can run at low speeds where a diesel would burn out its motors. From this comes the use of steam to assist diesel units up steep grades where they would have to run too slowly. A better understanding of counterbalance has resulted in lighter parts and in less rail pound with steam equipment. Electric drives will eliminate it. The 7,000-hp. 4-8-8-4-type steam freight locomotive will pull anything now permitted by law. There is, however, because of weight, length and width restrictions, a definite limit to the size of the present steam locomotive since it has to be built as a single unit—at least as far as present-day thinking goes.

Those are the main mechanical arguments, all of them far from settled. But there is still another argument, and some forward-looking coal and railroad men are inclined to believe it is the most persuasive of them all.

That argument is merchandizing. The diesel has captured popular fancy, and it has not been by accident. Diesel manufacturers have sounded the theme over and over again that diesel power is the modern power. They have tied the diesel locomotive up in a pretty streamlined package and made it one of the symbols of the motor and mechanical age—the age of speed and

**POSTWAR DESIGN—The Pennsylvania's sleek T-1 coal burner is shown here in the course of a test run —one of the first pictures of the new locomotive in operation. It employs the poppet-valve principle and has two separate driving units, each powered by its own set of cylinders.**



comfort. In addition, they have provided service and advertising cooperation with railroads. Many coal men, and railroad men too, have permitted this parade to pass by bemused by the spectacle and doing little to gain attention themselves. They were handicapped by the fact that until recently they apparently were content simply to add gadgets to their product rather than to improve its design or performance.

# Coal's Prospects

Is there an answer to the trend to diesel power? Is there an answer which coal can help provide? Very definitely, yes. But to arrive at it more thinking along new lines must be devoted to the subject by coal and railroad men and locomotive builders. The approach that begins with "They will never replace the Iron Horse" must be discarded once and for all. They are replacing it, and along with it they are displacing coal. One medium-sized eastern road has bought enough diesel equipment to replace 200,000 tons of coal annually. Multiply that by the 135 Class 1 railroads in the United States and it totals up to a loss of 27,000,000 tons annually, or almost a quarter of the railroad business.

There are factors in the picture, however, on which coal should be quick to capitalize. Some of them are intangibles. Some are the results of long, tedious and expensive research. Added together, they give at least some idea of how coal can meet the problem.

To start with the intangibles: Most railroad men, most motive-power superintendents, are good steam men. They were brought up under steam, cut their teeth on it, watched it pull them through good times and bad, are familiar with it, understand it and like it. Along comes this new gadget, the diesel engine. So, while being sentimental about steam power, these railroad operating men must consider such practical matters as cost sheets and traffic loads. For their own protection they must examine the diesel. They are given a good sales talk, a good promotion by diesel manufacturers, and they try it out. But their hearts are still with steam. Proof of this is that every railroad operating man to whom *Coal Age* talked, quickly, sometimes vehemently, answered "no" to this hypothetical question:

"If steam power developed a locomotive comparable in all respects to the diesels, including cost, would you still buy diesels?"

But can such an engine be built? Today, no; tomorrow, possibly; the day after tomorrow, almost certainly. Will the day after tomorrow be too late? It may be, but coal-industry technicians, coal-hauling railroads and locomotive designers have raised money and engaged the best brains to try to beat whatever arbitrary deadline may be fixed. Research does not lend itself to haste, but at Battelle Memorial Institute, in Bituminous Coal Research, and among a small and as yet unorganized group of coal-company and railroad executives there is an unmistakable note of urgency in finding the answer. Here, quickly, is what has been learned so far:

## Valves and Efficiency

THE POPPET VALVE: Developed by the Franklin Railway Supply Co. and adapted by the Pennsylvania R.R. to its new T-1 "Postwar" engine. Not a new principle (it has been on automobiles for years), but new to locomotive design. It permits up to 20 percent better utilization of steam and is particularly effective at high speed, where the conventional piston valve gets to moving so fast it does not open wide enough to permit full distribution of steam. The T-1 will have four cylinders, operating in pairs. Some, but not all, of the increased steam utilization will be reflected in fuel economy and higher efficiency.

THE STEAM TURBINE: Looked upon by some as the best present answer to diesel power. It reaches higher efficiency than a reciprocating steam en-

gine, but so far has difficulty holding that level, unless provided with an electric drive where a generator keeps the power flow constant. The steam turbine has been widely experimented with in Europe, but current reports say only one is now in service. The Germans are reported to have discarded it as too expensive to maintain. It has no reciprocating parts and the direct connection to the axle would give smoother power. The difficulty of lubricating sliding parts at high temperatures also is eliminated. The electric drive is preferred, but may be too expensive. Early experiments in the United States revealed difficulty with condensers, but best opinion is that this can be overcome.

THE WATER-TUBE BOILER: An extremely attractive development from many aspects, since it would permit much higher steam pressures, with resultant increase in fuel economy and less frequent need for inspection. Experience on locomotives (there is only one in the country at the moment) has not been fortunate. Locomotive designers are inclined to resist it because of difficulty of maintenance, inspection and cleaning.

THE GAS TURBINE: Generally agreed on as the best solution, but too far in the future as a coal-fired railroad prime mover to answer immediate competition. The first gas turbines for railroads are almost sure to be oil-fired, although coal is considered the most economical fuel. If fuel oil sticks, then gas turbines may turn out another headache for coal. Metallurgical difficulties in use of coal in gas turbines have not yet been solved. Coal use, according to one railroad motive-power expert, would require either a gas producer on the locomotive or construction of the turbine to digest the ash.

FUEL: Pulverized coal is not practicable on present steam locomotives at this time, since the firebox would have to be redesigned to prevent slagging of flue sheets. However, if that could be overcome, pulverized coal, with a mill on the tender, would permit use of any type or size of coal, insure complete combustion of the fuel and allow the fire to be turned on and off, much in the fashion of liquid fuel, eliminating waste in banking. Colloidal fuel, dismissed lightly at first, is being given great consideration by some roads, one of which estimates that it would increase present fuel-carrying capacity about 15 percent. Use of 45 percent Bunker C oil would be economical, and under a process now being developed there is no difficulty with slagging from fly ash. The colloidal product is an interesting possibility, if worst comes to worst, as a substitute fuel to compete with oil.

GENERAL: Larger grate areas, lighter reciprocating parts, a firmer realization that an idle locomotive is a detriment both to the railroad and the locomotive, better repair and shop facilities, feed-water treatment, better combustion and improved air flow to reduce clinkering, improved counterbalancing, better steam passages, all have combined in the last few years to make the steam locomotive a more efficient and a more available unit. For instance, one locomotive builder, by improved design and better materials, brought a standard freight engine from 2,100 hp. with 195,000 lb. on drivers to 4,500 hp. with 201,000 lb. on drivers—an increase of 214 percent in horsepower with less than 10 percent increased weight.

## Plenty of Work Yet

Most of those plans, with the exception of the Pennsylvania's new locomotive and some of the lesser improvements, are still on paper. To transfer them to the laboratory and the rails will cost a great deal of money. One technician estimated that to build an experimental steam-turbine locomotive with an electric drive would cost $1,500,000. Is coal, with the help of coal-carrying railroads and other interested parties, willing to foot the bill? On the answer to that question hangs the problem of diesel competition.

Until very recently, there were three approaches to the diesel question:

1. The diesel is no good and never will be.
2. The diesel is not a serious threat because oil will soon be so scarce everyone will go back to coal.
3. "They can't do this to us," which relied on the pressure of coal's huge trade with railroads to keep them from using diesel equipment.

All three approaches are either lazy arguments or ostrich philosophy. The diesel may not, in some phases, be all that it is advertised, but day in and day out it is doing a job for the railroads, and those that use it are satisfied, even enthusiastic. They are the only ones whose opinion of the diesel really counts. Depending on the threat of an oil shortage is dodging the question. Arguments rage and will continue to rage over the nation's oil reserves, but this can be counted on: they are not going to dry up overnight. The nation's railroad executives are hard-headed businessmen. They have gone all through the fuel availability question, and while they all admitted they had considered the possibility of an oil shortage, not one of them was seriously concerned by it. It may or may not be a serious matter. What counts, however, is that the purchasers of diesel equipment do not consider it serious. Further along that same line, one expert has figured out that if all railroad equipment in the United States were dieselized, only 15 percent more oil than is now being used would be required. Expert coal technicians were amazed, but could find nothing wrong with the figures.

## Traffic No Argument

The traffic argument is the same one which some coal men accuse the diesel manufacturers of using against the railroads. In any case, it is specious. Roads which originate coal are converting to diesels. They may not be able to do this to coal, but they're doing it. It is an argument which has held in line only the large coal-originating roads, and some of them are using diesel switchers. It definitely is not the answer.

The answer is to design and market a locomotive that will meet diesel competition. That is the short, abrupt and only sure-fire conclusion. How can coal help do it? By supporting research programs, by providing Bituminous Coal Research and other organizations with sufficient funds so that they will have ALL the answers to fuel and combustion problems posed by the railroads; by providing the railroads with a uniformly good product; by trying to understand the problems of the railroads' motive-power and fuel engineers; and, above all, by changing its thinking to realize that the competition cannot be sidestepped or outflanked—that it must be met.

Is the cost and the trouble worth it? Here is what the operating vice president of one of the biggest coal railroads in the country thought about the future prospects of coal:

"The trend to diesels is revolutionary. Six diesels are today performing the work of ten present-day steam locomotives because of 24-hour service. . . . Some locomotive manufacturers say there will be no steam switch engines in the future unless the competition is met.

"If better coal-burning locomotives are not put on the market in time to meet postwar demand, then tonnage and the revenue to coal operators and of coal-carrying railroads will suffer, even to the point of precipitating a high rate of mortality in the coal industry, with consequent loss to coal-carrying railroads. THERE IS NO MORE CRITICAL SUBJECT COMMON TO THE TWO INDUSTRIES THAN THE DIESEL TREND."

# QUALITY WITH EFFICIENCY

## Provided by Praco Preparation Plant

### Jig and Tables Prepare Steam and Metallurgical Coals—Mine-Run Blending Assures Uniform Feed to Plant—Special Equipment Also Evens Feed to Tables—Settling Tanks Salvage Solids From Water

By W. C. CHASE
General Superintendent of Mines

And M. E. HAWORTH
Chief Mining Engineer
Alabama By-Products Corp.
Birmingham, Ala.

WITH A RATED capacity of 550 tons of raw feed per hour, a modern preparation plant completed this summer by the Alabama By-Products Corp. at its Praco mine in Jefferson County, Ala., 30 miles from Birmingham, incorporates special features in slope hoisting, rotary-dump design, and filling and drawing from storage and blending silos to minimize segregation; also a new type conveyor and a weight-controlled feed hopper and tapered screw to prevent segregation in table feeding. Yield percentage of metallurgical coke—the special product of the mine—has been increased from 40 to 60. One million board feet of lumber, all treated on the job, was used in construction and 5,500 cu.yd. of concrete was poured.

On the night of July 28, 1943, fire of unknown origin completely destroyed the preparation plant at Praco. The debris were cleared away and a temporary tipple was erected. Within four weeks the mine was back in operation on a reduced production basis. Plans were immediately completed and construction started on a new modern tipple and preparation plant. The new plant, using principally Link-Belt equipment, was put into use on "D" Day, June 6, 1944.

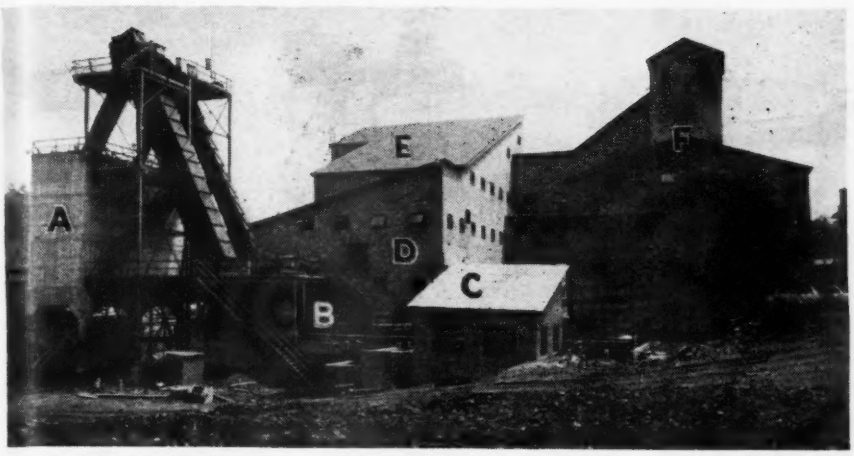
The mine is being operated on the Mary Lee seam, the coal from which is used for steam purposes and for the manufacture of coke by the Alabama By-Products Corp. in its own by-product coke ovens at Tarrant City, Ala., where four batteries of Koppers ovens produce more than 600,000 tons of coke yearly. Coke from this plant is sold in 36 of the 48 States. To provide the best possible preparation facilities, a washing plant has been erected that will prepare the highest obtainable quality of coal, not only for the manufacture of coke but also for steam purposes.

The rated capacity of the plant is 5,250 tons of clean coal per day on a two-shift operating basis. The plant is arranged to prepare 4x⅜-in. for steam markets and ⅜x0-in. for the manufacture of coke. However, it is designed with facilities to make other sizes.

Praco mine is a slope operation with the slope extending from the outcrop to the basin of the seam, a distance of approximately 8,000 ft. The course of the slope is S. 70 deg. W. and it pitches down on an average grade of 6.5 percent. On the surface at the mouth of the mine there is a landing-side-track yard, the direction of which, because of the terrain, has been changed from that of the slope S. 86 deg. W. This change in direction, with a total angle of 16 deg., is facilitated for trips from the mine by the installation of seven side sheaves spaced 5 ft. apart around the curve on each track.

Single-track operation is the practice on the lower half of the slope, with double track on the upper half. The surface landing yard consists of

Praco preparation plant for steam and metallurgical coal. Left to right are the mine-run storage and blending silos, a primary screening and crushing house, refuse bin feeding to the two conveyors up the hill and, at the right, the finished products end




**Finished products end of Praco plant, showing, *A*, railroad-car loading bins for metallurgical coal; *B*, settling tanks; *C*, pumphouse for tables and refuse sluicing; *D*, jig washery; *E*, secondary screening plant; and, *F*, table plant.**

three tracks, the center for loaded trips and the other two for empty trips. Beginning at the mouth of the mine the grade of the approach to the loaded landing track is increased to 10 percent for 150 ft., after which the track runs level 335 ft. to the upper end, where both loaded and empty tracks are on the same level. The grade of the empty track from this point to the mouth of the mine is 3 percent down.

Electric locomotives are used in the mine to haul 2-ton-capacity wooden mine cars from the loading point to a sidetrack at the bottom of the slope. The cars are hoisted to the surface in trips of 24 each. Two electric hoists pull the trips to the surface. Both are in a brick building just ahead of and in line with the landing yard.

These hoists are installed one just ahead of the other. The center of the drum on each hoist is 5 ft. 9 in. on each side of a center line between them. The front hoist (Hardie Tynes Mfg. Co.) is equipped with a 7-ft.-diameter drum. It is driven by a 2,-300-volt 575-r.p.m. 800-hp. Westinghouse motor. The rear hoist (Vulcan Iron Works) is equipped with a 10-ft. 3-in. drum. This hoist is driven by a 2,300-volt 445-r.p.m. 850-hp. Westinghouse motor. The hoists operate at rope speeds of 1,600 and 1,700 f.p.m. respectively, and are equipped with overwind and other safety devices.

The hoists are installed so that trips from the mine, when they reach the halfway point on the way out, are hoisted on one track (of the double track) by one hoist and on the other track by the other hoist. The surface tracks are arranged so that the loaded trips from both tracks land on the center track of the landing-sidetrack yard.

After the loaded trip is landed the hoisting rope is uncoupled and transferred to an empty trip standing on the landing yard. This trip is being held in place on a 3-percent downgrade with a barney car at the rear end. When the barney car is released the trip moves off by gravity into the mine. The barney car is operated and controlled by a single-drum hoist at the upper end of the landing yard and runs on a narrow-gage track between the rails of the empty track. When released it runs into a pit, allowing the empty trip to pass over it. After the trip has passed, the barney car is pulled out of the pit and is then in position to hold the next empty trip.

This method of holding the empty trip is economical and safe, since

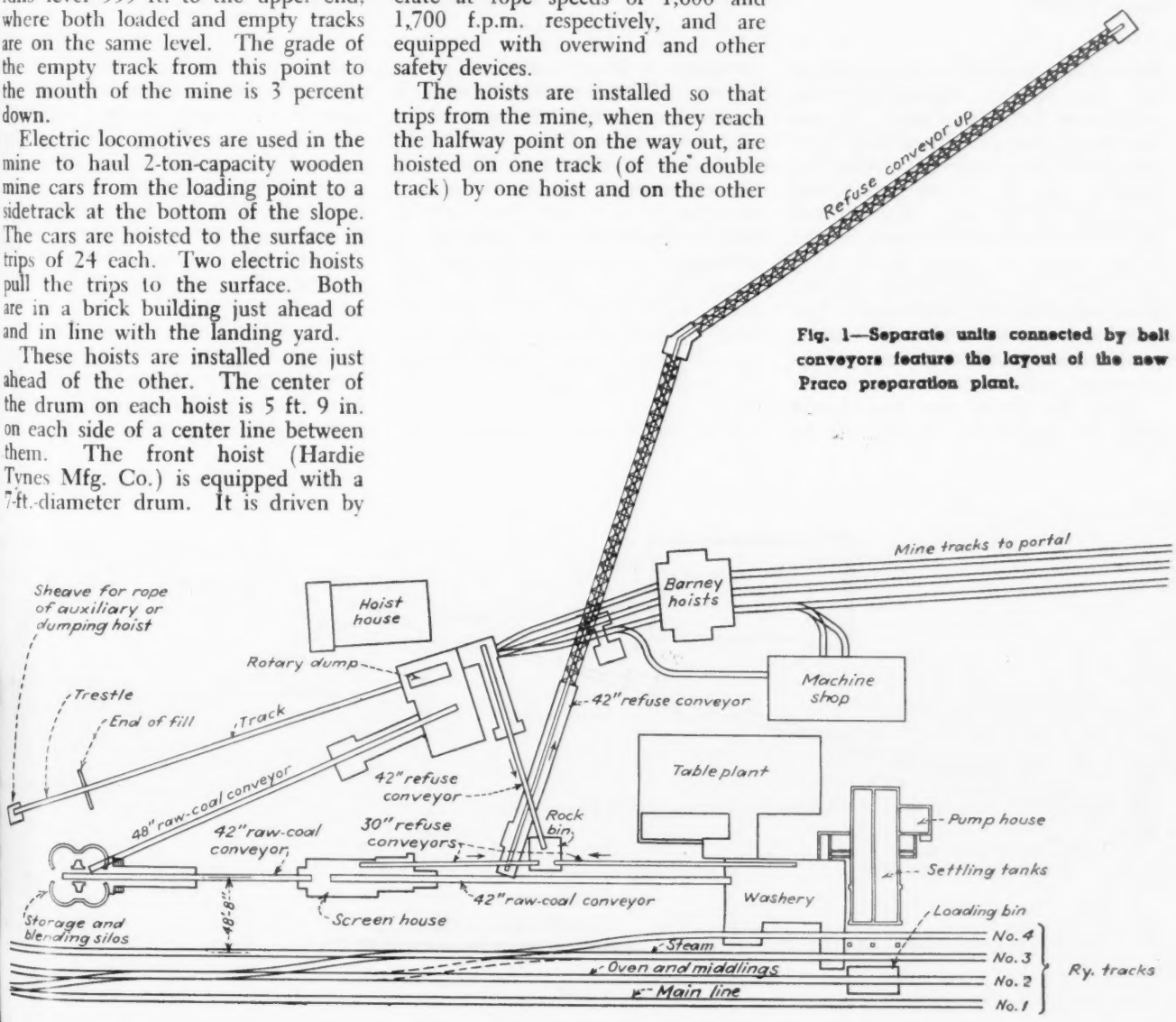



**Fig. 1—Separate units connected by belt conveyors feature the layout of the new Praco preparation plant.**

**The refuse bin is fed by three belt conveyors carrying mine rock from the car dump, picking-table refuse and refuse from the jig and table plants.**

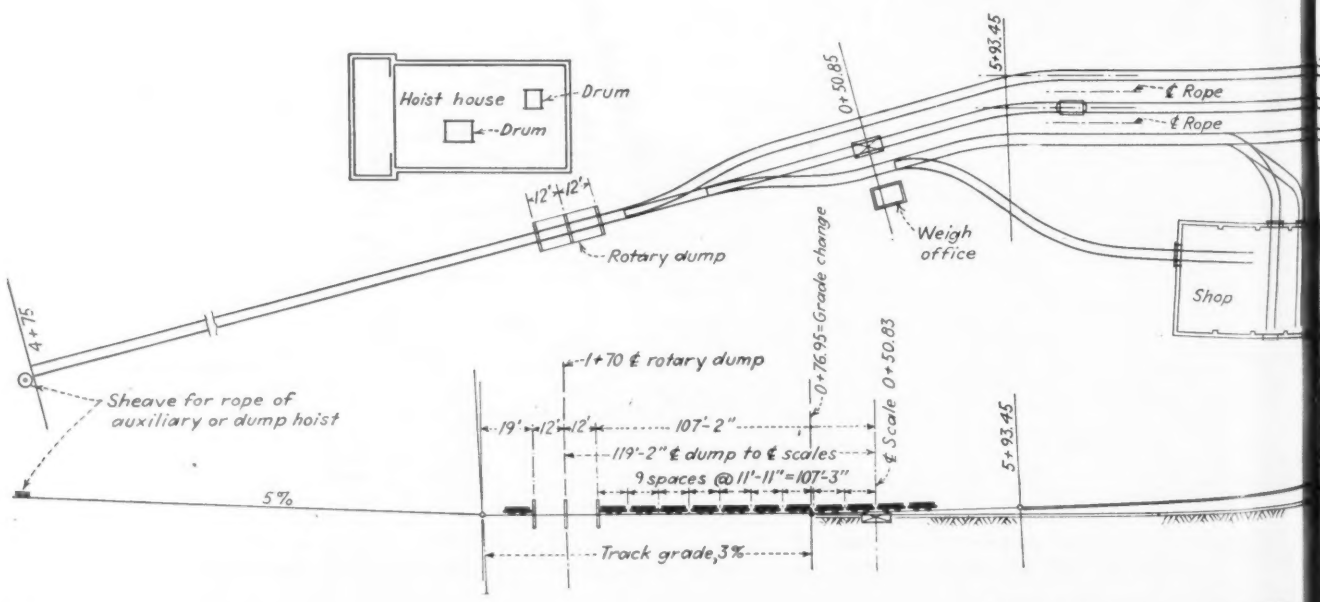
**Showing the settling tanks, sludge conveyors and elevators to the byproduct bins. The small building at the left houses a pump for the tables and another for sluicing refuse at the top of the hill.**

there is no danger of a runaway unless the rope breaks. Additional safety precautions have been taken in case this should happen. Electrically operated safety or derailing switches are installed on the empty tracks just below the barney pits. The controls for the operation of these switches are located near the barney hoists in a convenient position for the operator when releasing the barney car. The switches always are kept in a derailing position except when the empty trip is passing over them.

After the empty trip has started back, the loaded trip is ready to be dumped. A 30-hp. electrically driven two-car Link-Belt rotary dump is located near and on one side of the main hoist house, 180 ft. from where the loaded trip is landed. The dump location being off the line of the landing yard, a short curve has been installed in the track to the dump, which continues on a tangent through the dump and on beyond 300 ft. The grade of the loaded track from the landing point is level for 85 ft., then up a 3 percent grade to and through the dump, with 5 percent above the dump.

The loaded trip is pulled to the dump by an auxiliary or dump hoist located in the dumphouse and on one side of the rotary dump. Controls are arranged so the operator can see the position of the cars at all times and note their contents when being dumped. The rope used for hoisting is run from the drum to the upper end of the track beyond the dump, around a 5-ft. sheave and back to the trip.

The loaded trip is hoisted and dumped without uncoupling the cars. The dump-hoist engineer "spots" the loaded cars in the dump beginning with the first two cars of the trip. He

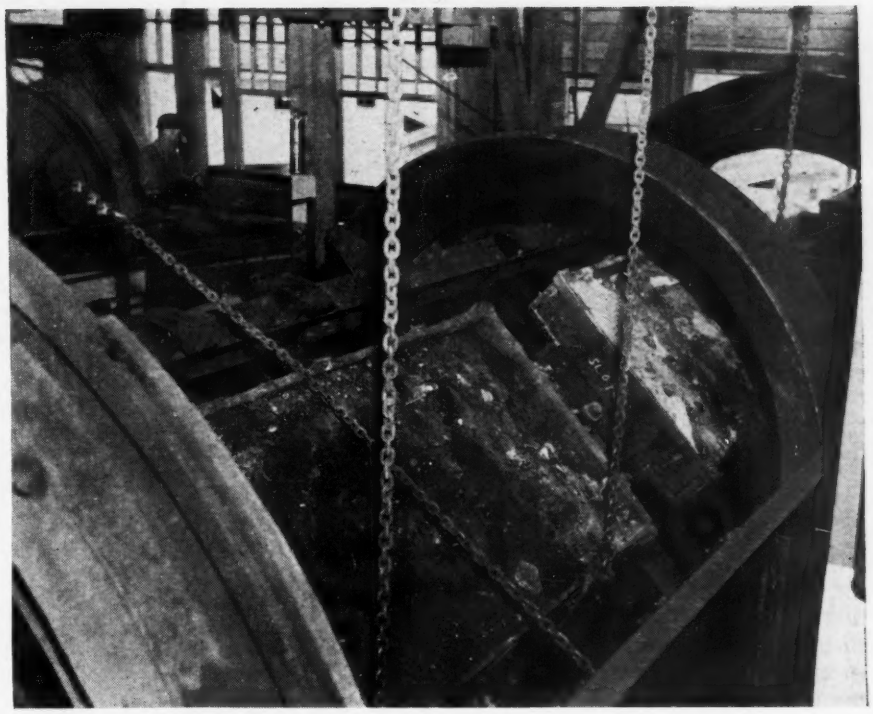


then dumps the cars by means of conveniently located pushbuttons. The dump revolves through an angle of 135 deg., automatically reverses itself and returns to and stops automatically in the upright position. Auxiliary controls are installed for use in case of failure of the automatic equipment. Specially proportioned 3-link couplings are used so that the car can be revolved 135 deg. without excess stress in the couplings.

After all the cars have been dumped, the trip, being on a 5-percent grade, is dropped back by gravity to the empty track of the landing-side-track yard, where it is held by the barney car. The rope can then be uncoupled from the empty trip and coupled to a loaded trip ready for the next dumping cycle.

Difficulty would be experienced in making the coupling from the main slope hoist rope to the empty trip and from the dump hoist rope to the loaded trip, unless some means were provided for slack in the ropes when making the coupling. For this purpose a car haul is installed on the loaded track near the landing point. After the main slope hoist rope is uncoupled from the loaded trip, the trip is moved ahead a few feet with the car haul, thus providing the necessary slack for transfer of ropes.

Between the landing point for the loaded trip and the dump is a single-car Streeter-Amet self-recording track scale. The scale is 60 ft. ahead of the landing point and on level track. Above the scale the grade is increased to 3 percent to the dump, a distance of 80 ft. With this arrangement the cars are weighed on level track without uncoupling them from the trip and the speed of the trip is not over 100 f.p.m. when any cars are being weighed. Electrically operated track switches are installed between the scale and the dump so that the empty trip returning to the landing-side track will not pass over the scale. The electric switches are operated by pushbutton controls located near and operated by the dump-hoist engineer.



**Special two-car rotary dump in operation, showing chains and hinged angle-iron sections which permit dumping various-sized cars.**

Although 2-ton wooden mine cars are now being used in mine operation, it is proposed later gradually to install large capacity steel cars. With this in view it was necessary to design a dump which would operate with the present cars, the proposed cars and a mixture of both types of cars.

A dump to fulfill the above conditions was designed by Link-Belt. As two different length cars were to be dumped at the same time, it was necessary to arrange the dump with a short section of disappearing track at each end, automatically operated. However, operation of the disappearing track section is not necessary with one length of car. The dump has one bearing ring at each end supported on rollers.

With different width cars it was necessary to provide some positive automatic means of holding them in the dump when it was being rotated. This is accomplished by the installation of chains which, when the dump

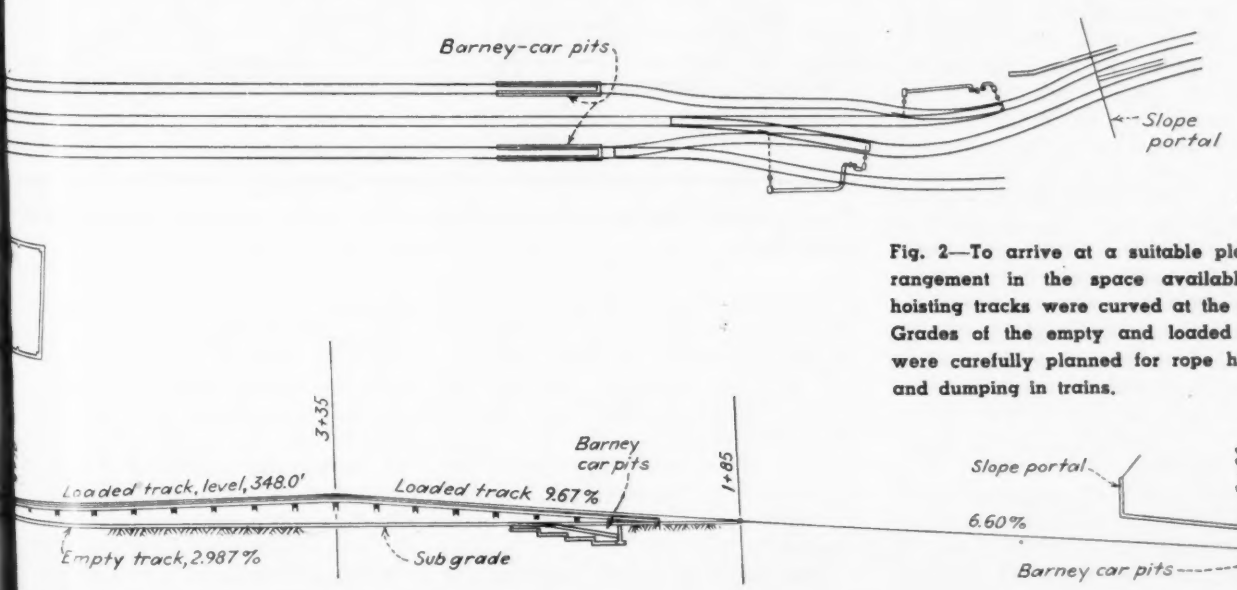



**Fig. 2—To arrive at a suitable plant arrangement in the space available, the hoisting tracks were curved at the portal. Grades of the empty and loaded tracks were carefully planned for rope haulage and dumping in trains.**

rotates, wrap around the car and hold it firmly on the rails. Three chains are used per car, one near each end and one in the center. The two chains near the ends of the car are fastened on one side of the dump at rail level and extend vertically upward, just clearing the side of the car. However, a short angle-iron section (about 33 in. long) is used on the lower end of each chain to fasten it to the dump. This section is hinged at the fastening and extends upward to the height of the top of the car. At this height a small clip is attached to the angle iron and engages the edge of the side of the car when the dump is rotated.

### Chains Hold Cars

The rotation of the dump is toward the side on which the angle-iron section and chains are installed. The chain section is only long enough to go around the car, and to the upper end is attached a $\frac{3}{8}$-in. wire rope. The rope extends vertically upward over a sheave and then horizontally to another sheave on one side of the building. A counterweight is attached to this end of the rope and is of sufficient weight to hold the car on the near rail when the dump is being rotated. To hold the car on the off-rail a similar arrangement with one chain over the center of the car is provided. However, this chain is fastened to the dump so that it is above the car and in a horizontal position when the dump is upright. Sheaves are placed so that counterweights on the side of the building provide enough tension in the chain to hold the car on the off-rail when the dump is rotated.

As the cars are being dumped, the dump rotates only a few degrees before the clip on the angle section engages the top edge of the near side of the car near each end. As the dump continues to rotate, the horizontal chain engages the top edge of the off-side of the car near the center. This arrangement of counterweighted chains holds the car in place and firmly on the track even in the rotated position. The system has the advantage that the car is supported from the top and any width car (within limits) can be dumped.

To offset the power used to raise the counterweights, an additional rope is installed on the dump and to it is attached sufficient weight to counterbalance the load due to the counterweights and operation of the dump.

The auxiliary or dump hoist (near the rotary dump) is equipped with a single 5-ft.-diameter drum and operated at a rope speed of 500 f.p.m. It is driven by a 150-hp. 2,300-volt Type M. General Electric induction motor connected through a Jones 3-ratio herringbone reducer. A General Electric Thrustor brake is used for the normal operation of the hoist, with a manually operated brake for emergency. Both motor and brake are operated by pushbutton controls located near and operated by the hoist engineer.

Beneath the dump are installed two fly-gates, one for each car in the dump. These gates are arranged so that they will divert the contents of the cars either into a small coal-storage bin or a small rock-storage bin. The fly-gates are operated by an electric motor, the controls of which are within easy reach of and operated by the dump-hoist engineer.

The speed of the dump, the hoisting of the loaded cars to the dump and

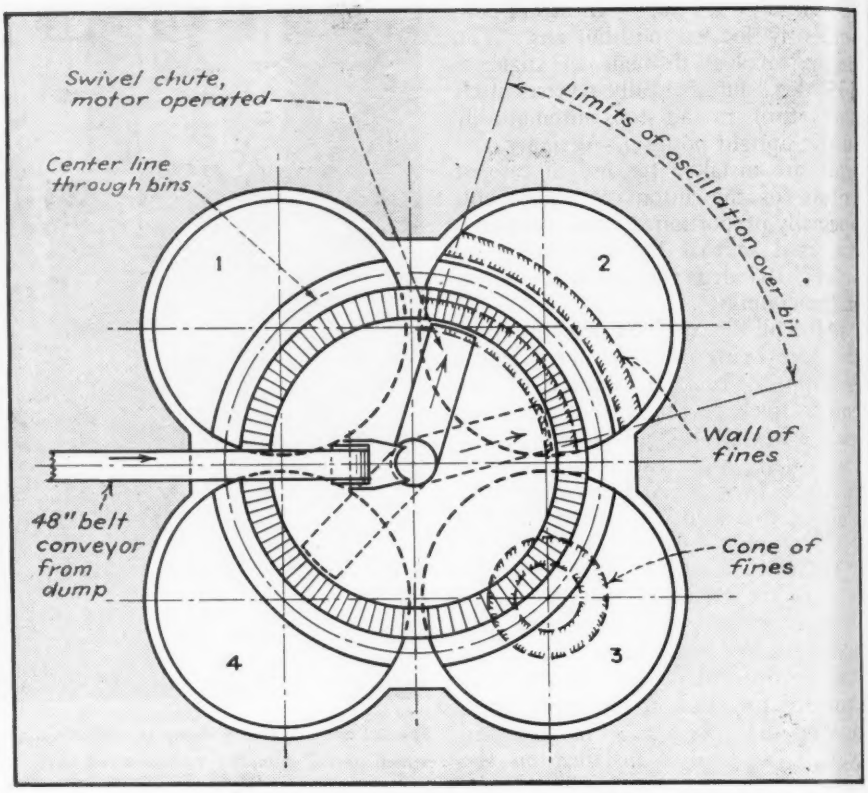



**Fig. 3—Silos for raw-coal storage and blending are supplemented by a swivel chute feeding down into them through arc-shaped slots.**

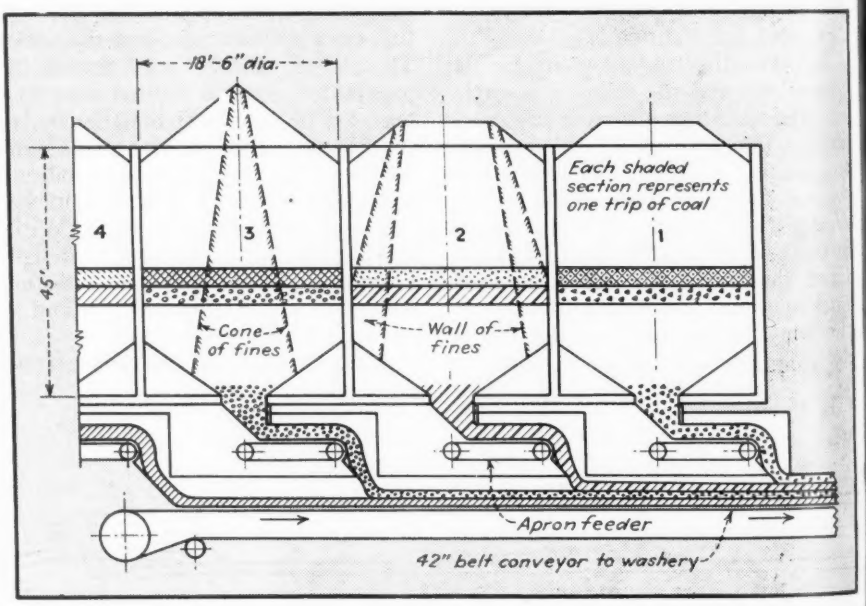
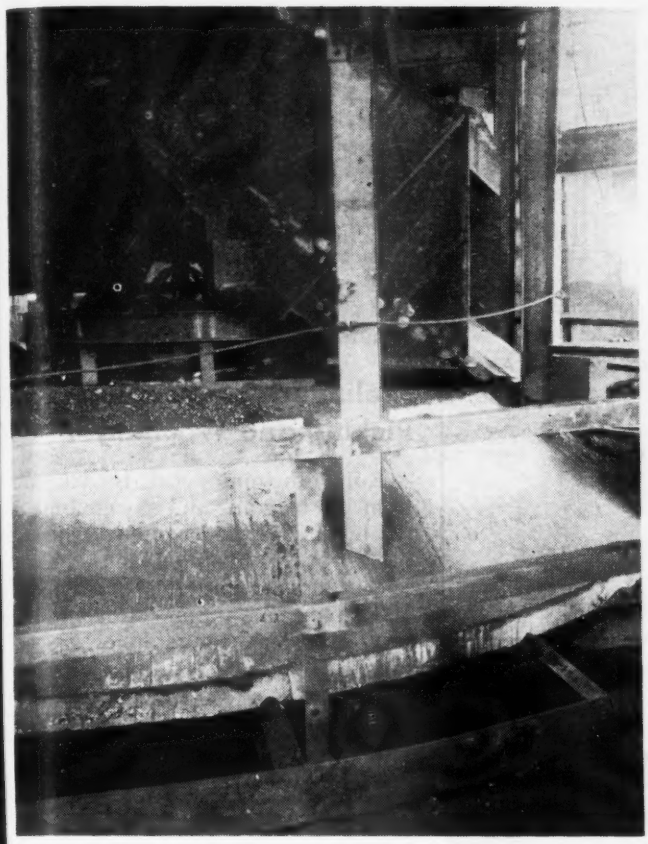
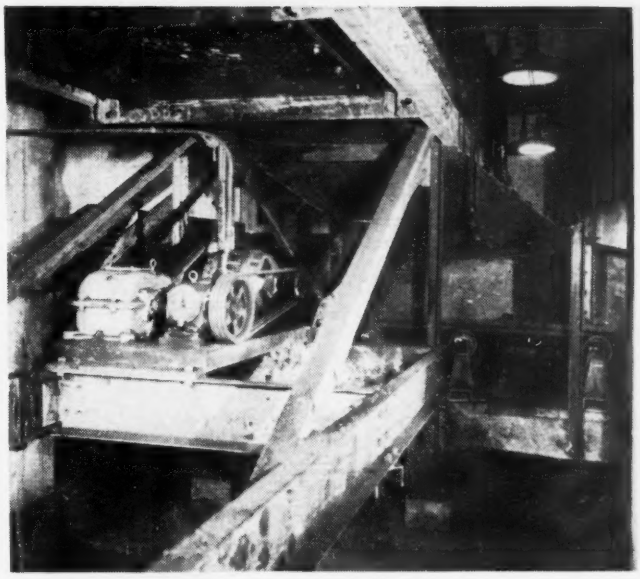



**Fig. 4—Showing how blending is accomplished by feeding arrangements into and out of the silos.**





**Under the silos. Overhead is one of the four apron feeders from the silos to the belt conveying the coal to the primary screens.**

**The swivel chute over the tops of the four storage and blending silos can move in a complete circle to dump to any one of the four. An arc-shaped slot opening into one silo shows in the foreground. In normal operation, the chute oscillates back and forth over the width of the slot until the operator pushes a button to switch to another silo.**

the return of the empty cars to the landing-side track are so timed and coordinated with the hoisting cycle of the trips from the mine that there is no delay to the mine operation from the dumping cycle.

Three men are employed in dumping and weighing. One, a chainer, works at the head end of the mine landing yard or sidetrack and transfers the hoisting ropes. This man also operates the barney hoists and safety derailing track switches.

A second man is stationed in the scalehouse to remove the checks from the cars and make up a tally sheet.

The third man is the dump-hoist engineer who operates the hoist, dumps the cars and operates the flygates. He also operates the electric track switches for the returning empty trips to the sidetrack. The engineer has no difficulty in operating this equipment, it being automatic and equipped with pushbutton controls.

A spur sidetrack is installed on the empty line of the landing-yard sidetrack so that cars can be conveniently switched to the repair shop in the same building with the machine shop. This shop is a 40x90-ft. brick building parallel to and on one side of the landing yard. Machine tools, cranes, etc. are so installed and arranged in this building that repairs to equipment can be made promptly and economically.

## Storage and Blending Bins

The storage and blending bins for the Praco preparation plant comprise four concrete silos 18 ft. 6 in. in inside diameter and 45 ft. high, with a combined capacity of 1,000 tons of mine-run coal. This capacity was established to maintain normal mine production in case of delay in the washery and to permit uniform feed to the washery regardless of fluctuating mine tonnage.

A careful analysis was made of the method to be employed for filling the storage bins and for feeding the coal from the bins to the washery. Uniformity of size and chemical analysis of coal delivered from the washery to railroad cars is directly dependent upon the uniformity of size, moisture and chemical analysis of the coal fed to the washery. Coals delivered from different sections of most mines vary widely in sieve, moisture and chemical analyses, particularly where hand loading and different methods of mechanical loading are employed. At present 60 percent of the Praco production is loaded by Joy machines onto chain conveyors, 10 percent hand-loaded onto the same type conveyors and 30 percent hand-loaded into mine cars. The Joy loading is being increased. Average seam thickness is 48 in.

The quantity of sink in the raw feed fluctuates widely as between hand-loaded coal and machine-loaded coal. In this respect the Mary Lee seam is subject to much wider variations than seams in the Northern and Eastern Appalachian fields.

Methods to prevent segregation and insure uniformity in sieve, moisture and chemical analyses were carefully studied and the silos arranged to obtain optimum results.

The coal is moved out of the hoppers under the rotary dump by two 48-in. apron-type feeders to a 48-in. belt conveyor, which delivers the coal to the silos at a rate of 900 tons per hour. A swivel chute is provided for receiving coal from the 48-in. belt and for delivering it to the silos. One trip of coal (approximately 60 tons) is delivered into one silo in approximately 4 minutes. The discharge end of the swivel chute traverses an arc passing through the center of the silos and the chute is oscillated back and forth over one silo until the trip has been dumped.

Between trips the dumper revolves the chute to the next bin by means of a maintained contact pushbutton control and after the chute has reached the next bin into which coal is to be discharged it is automatically oscillated over the bin by automatic control until the trip has been dumped. Operation of the chute is controlled by the dump operator. Lights are arranged in front of him to indicate the bin over which the chute has been placed, with addi-

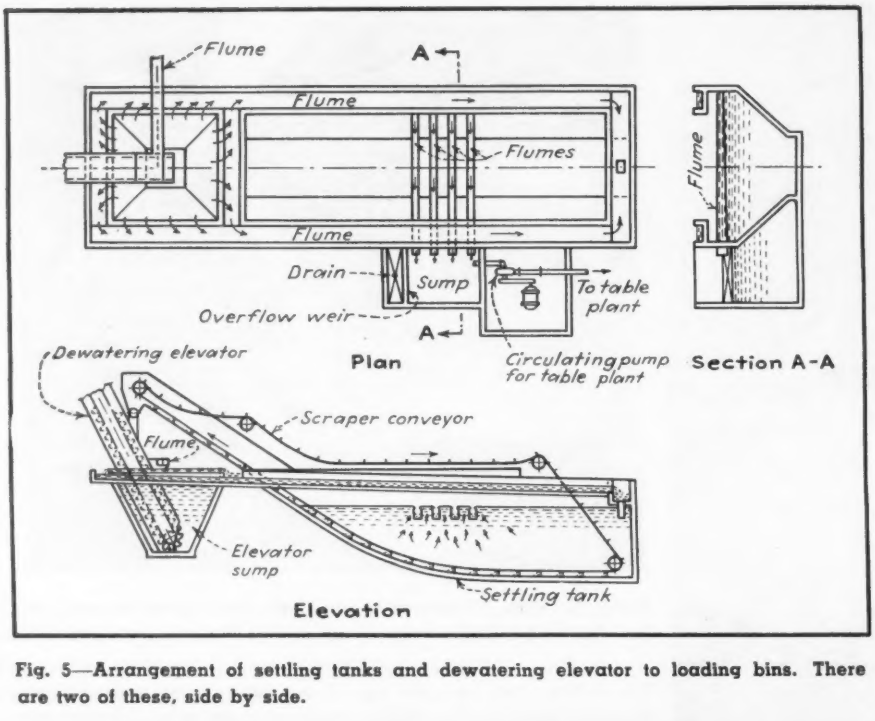



**Fig. 5—Arrangement of settling tanks and dewatering elevator to loading bins. There are two of these, side by side.**

**One of three totally inclosed vibrating screens handling mine-run from the silos. These screens split the feed into steam and metallurgical coal.**

tional lights indicating that the chute is oscillating as desired.

The reason for oscillating the chute over the full diameter of each bin is illustrated in Fig. 3, which shows a wall of fines in the center over the full diameter of each bin with the coarser coal to the outside. If the chute remained stationary while filling the bin, a cone of fines would develop which would be conducive to more violent segregation.

As illustrated in Fig. 1, it may be assumed that the operating levels of all the bins are substantially at the same elevation, and since coal from different sections of the mine radically differs in sieve and chemical analyses, the coal in each bin at the same elevation is of different quality, different sieve analysis and different moisture content. As these coals reach the feeders, each feeder delivers its kind of coal to the belt conveyor and a more or less uniform mixture of the entire mine production, therefore, is delivered continuously to the washery. This uniformity assures comparatively uniform sieve and chemical analyses of the washed coal and also materially assists the washing equipment by reducing the wide fluctuations in sink in the raw feed, and in tonnages, that would otherwise normally prevail. Considering the many functions which the storage and blending bins perform, they are considered as important in the preparation of metallurgical and steam coals as the washery equipment.

## Preliminary Screening, Picking and Washing

Run-of-the-mine coal is delivered from the blending and storage bins to the preliminary screen house, where it passes over a combination shaking screen and picking table operating at 100 r.p.m. on a 6-in. stroke. The sizes over 8-in. round holes are delivered to one side of the table, where one picker removes the coal from the rock, as the major portion of the material above 8-in. is shale and rock. This rock passes to a conveyor which delivers it to the refuse bin, the coal passing through chutes to a Jeffrey single-roll crusher, where it is reduced to a minus 5-in. size. The material passing through 8-in. and over 3-in. round holes is delivered to the other side of the table, where two pickers remove the larger pieces of rock, cap boards and other wood particles that are not ordinarily removed in the washing process.

It has been found by previous experience in preparing Mary Lee coal that pieces of shale and rock larger than 6 in. disturb the water distribution in the jig and materially reduce its efficiency. For that reason the removal of these particles by hand-picking results in increased efficiency in jig operation.

The sizes between 3 in. and 8 in. after hand-picking are passed through the single-roll crusher (5-in. opening) together with the coal removed from the other side of the picking table. The coal passing through the crusher joins the minus 3-in. bypassed around the crusher onto the 42-in. belt for delivery to the washery.

## Final Screening

Crushed run-of-mine, after hand-picking to remove large rock, timber, cap boards, etc., is delivered to a scraper-type conveyor at the top of the washery structure. This conveyor delivers the coal to three 6x14-ft. Robins Gyrex screens, with the conveyor chutes to the screens so arranged that the coal is spread uniformly over the

entire width of each screen to obtain maximum screening efficiency. The coal also is reversed in direction just before being delivered to reduce the velocity over the screens. The screens are arranged with double decks, the top deck being fitted with ⅞-in. square-mesh woven-wire screen cloth and the bottom deck with 7/16-in. rectangular mesh cloth. The top decks scalp off the heavier and more abrasive particles to reduce scouring on the lower decks, which necessarily are fitted with finer wire.

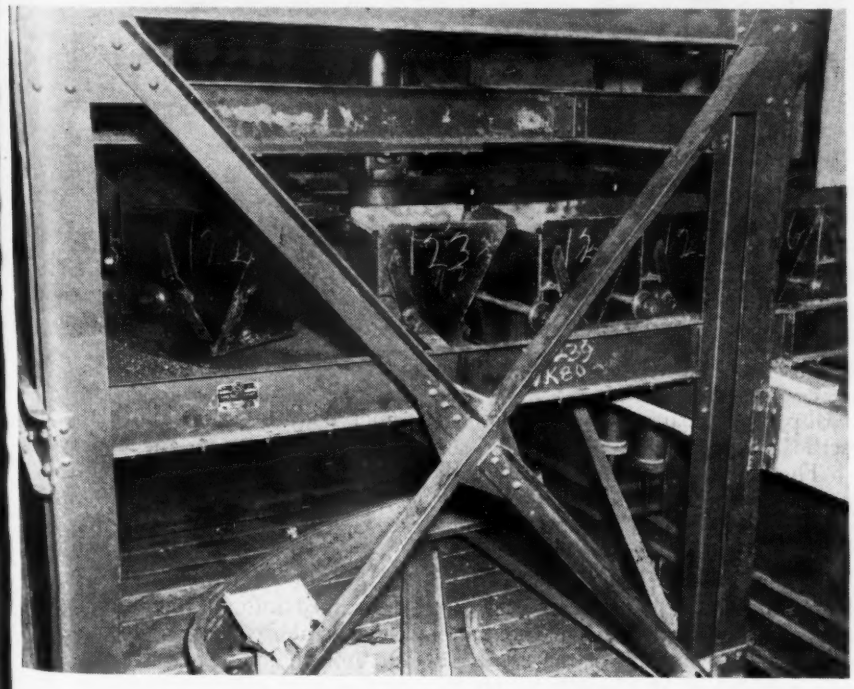
The material passing over the ⅞-in. and 7/16-in. decks comprises the steam coal, which is delivered to a scraper-type conveyor employed for feeding the entire plus 7/16-in. products to the Baum-type jig. The material passing through the 7/16-in. decks comprises metallurgical coal and is delivered by means of a scraper-type conveyor to a 100-ton table storage bin.

## Jig Operation

The 5x7/16-in. steam coal is flumed into a 6-cell Link-Belt air-pulsated (Baum-type) jig with two compartments. The first compartment comprises two cells, each 7 ft. wide by 3 ft. 3 in. long, and is used for removing the major portion of the heavy-gravity sink. This compartment is fitted with an elevator with a capacity in excess of 100 tons per hour. The sink in this size of coal comprises an average of 40 to 50 percent of the raw-coal feed and as the number of mechanical loaders in the mine is increased it is anticipated that the sinks removed in the first compartment will average 30 to 35 percent or more of the raw-coal feed.

The secondary compartment comprises four cells, each 8 ft. wide by 3 ft. 3 in. long, and is fitted with an elevator having a capacity in excess of 100 tons per hour. This compartment is employed for removing the finer heavy-gravity sinks, the thin large-diameter heavy-gravity sinks known as "floaters" and a certain quantity of heavy bone with some laminated particles. Speed adjustments of the air valves are effected through use of Link-Belt PIV variable-speed drives, an unusual feature.

The jig is provided with a circulating pump with a capacity of 5,000 g.p.m. and a blower with a capacity of 3,350 c.f.m. at 3-lb.-per-square-inch pressure. Because substantially all of the finer materials (below 7/16-in.) are removed from the jig feed, larger volumes of water are required than would be necessary if the fines were fed to the jig with the coarser sizes. It has been found in extensive washing practice that it is necessary to carry much deeper slate beds when jigging Mary Lee coal than when treating coals other than Mary Lee. For that reason it has been necessary to alter the design of the Baum jigs employed in this district, where slate beds up to 18 in. deep are not uncommon. The total depth from the jig screen plate to the overflow lip has been established at 26 in. This requires much higher air pressures than are required with slate beds 6 to 8 in. thick and total depths of bed of 15 to 18 in.



**Tail end of new-type conveyor unit feeding the tables at Praco.**

## Washed-Coal Sizing

Coal from the jig is flumed to a washed-coal shaking screen of the Parrish type operating at a speed of 150 r.p.m. with a stroke of 4 in. The upper deck is fitted with 80 sq.ft. of 1-in. perforated plates 5 ft. wide by 16 ft. long, and the lower deck is fitted with 120 sq.ft. of 3/32-in.-diameter perforated stainless-steel plates 6 ft. wide by 20 ft. long. The upper deck is employed for removing the coarser materials which comprise approximately 30 percent of the total jig-washed product, and the lower deck is used primarily for removing the excess water. The products from the upper and lower decks are remixed at the end of the shaker and discharged into railroad cars through a bifurcated chute arranged with a fly-gate to facilitate changing cars without shutting down the shaker. The upper and lower decks of the screen also are arranged for removing such products as are desired for domestic coal sales.

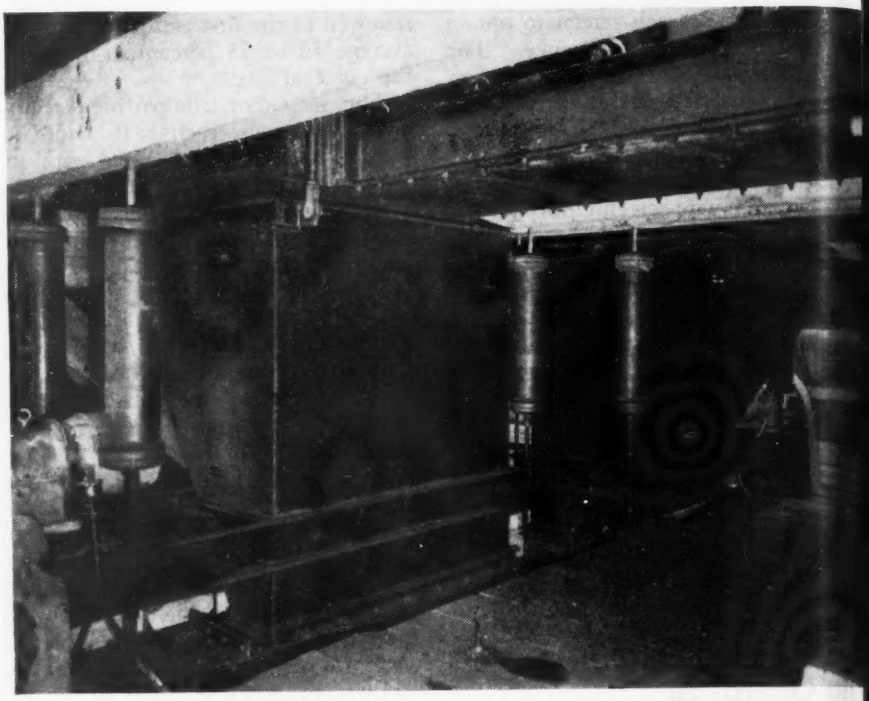
## Table Plant

It has been found from previous experience that better performance is secured from tables for the preparation of the finer sizes of Mary Lee coal than from any other washing process. Consequently, this plant has been equipped with 16 Deister-Overstrom diagonal-deck tables, each 16 ft. long with a capacity of approximately 7½ to 8½ tons of clean coal per hour, the feed rates being 9.0 to 10.0 tons per hour.

Observation of the previous table plant at this mine very clearly showed the effects of segregation on performance, and the method of feeding has been radically changed to reduce segregation ahead of the tables. A small hopper with a capacity of about 1,500 lb. is installed above each table and is fitted with a differential or tapered screw feeder arranged to draw continuously from the entire length of the hopper instead of from one side only. These hoppers are spring-suspended and are arranged so that when a hopper requires coal it rises, because of the reduced spring compression, whereupon the tripper on the hopper engages the trippers provided on the undercut gates of the buckets fitted on the bulk carrier conveyor which delivers coal from the 100-ton storage bin to each of the table hoppers.

This bulk carrier conveyor (a new design by Link-Belt and tradenamed "Side-Kar Karrier") consists of a series of overlapping buckets attached to a roller chain traveling in a horizontal plane on tracks over the two rows

of eight tables each. Horizontal sheaves are installed at each end of the table plant to provide a continuous conveyor. These buckets have open tops, the two sides and front having vertical plates, and the rear side having a sloping plate. Each bucket is fitted at the bottom with an undercut gate that can be tripped to open over the table hoppers when the conveyor is traveling in the proper direction. The buckets travel under the 100-ton bin and are self-filling from the bin through multiple openings in the bottom. The multiple openings materially reduce segregation within the bin and, by delivering all the coal from any one bucket of the bulk carrier conveyor into one of the table hoppers rather than part of the coal only, segregation is further reduced. While the plant is still in the early stages of operation, it has been determined that this method of feeding tables has effected a decided reduction in segregation as compared with the previous method of a drag scraper with multiple slide gates in the bottom.



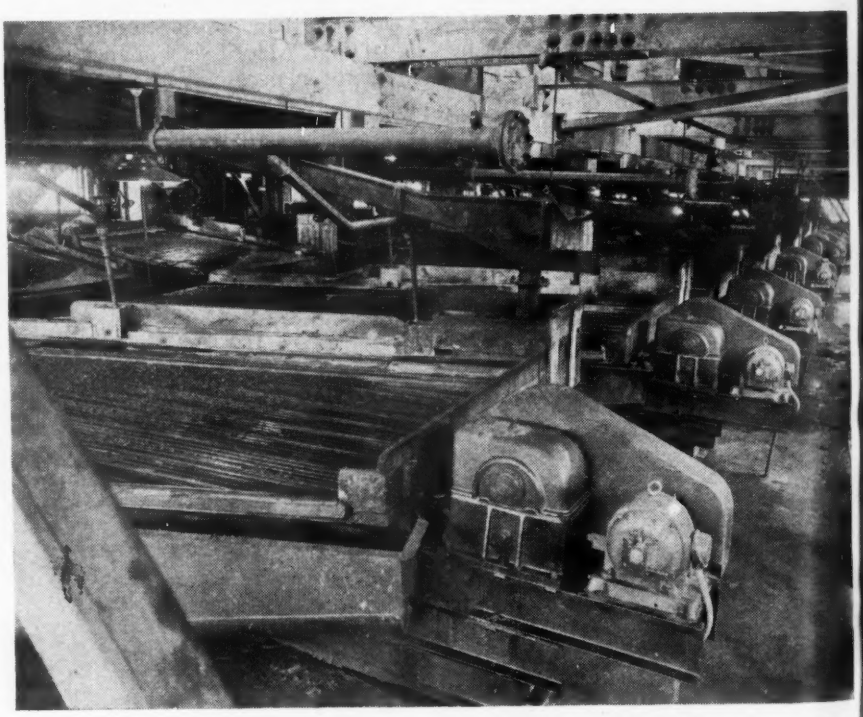
**Two of the 16 spring-suspended feed hoppers for the coal-washing tables. Tapered design causes feed screw to draw from full length of hopper. When the hoppers begin to empty they rise and trip the gates of the feed conveyor just above them.**

## Elevator and Settling Tank for Metallurgical Coal

The clean coal from the table plant is flumed to the metallurgical-coal elevator sump (Fig. 5). The elevator is a Luhrig dewatering unit operating at 40 f.p.m. It removes substantially all of the coal except the extreme fines. Excess water overflows the entire periphery of the sump and is carried through concrete flumes to the rear end of the concrete settling tank, where it is released near the bottom.

The water flows toward multiple flumes near the middle of the tank, provided for removing the water with a minimum of weir "pull." A cross-sectional area of 60 sq.ft. was provided for a length of 36 ft. 9 in. from the inlet end of the tank to the overflow weir to provide a reasonably long detention period.

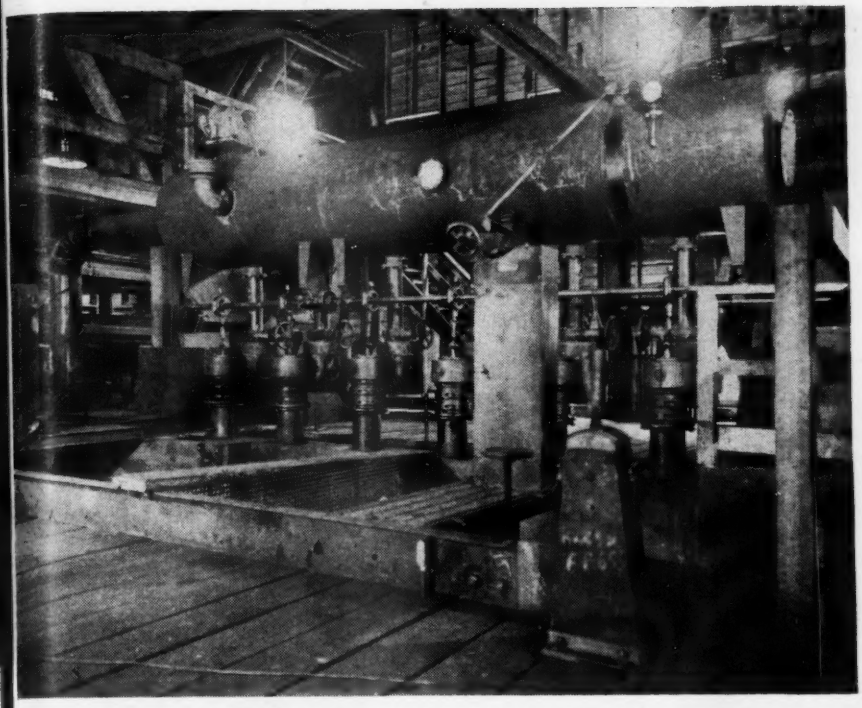
Approximately 2,200 cu.ft. of settling volume is provided for a circulation of about 3,000 g.p.m., or 400 c.f.m., of water, making the average detention period 5½ minutes. The surface area traversed by the weirs is 187.5 sq.ft. The area occupied by the weirs is 45.0 sq.ft., leaving 142.5 sq.ft. for upward currents, resulting in an upward current velocity of 2.8 f.p.m. in the vicinity of the weirs. These upward current velocities permit the removal of the water with no coal particles coarser than 48-mesh. However, the settling time of 5½ minutes prior to reaching the weirs permits all coal particles coarser than 100-mesh to settle.



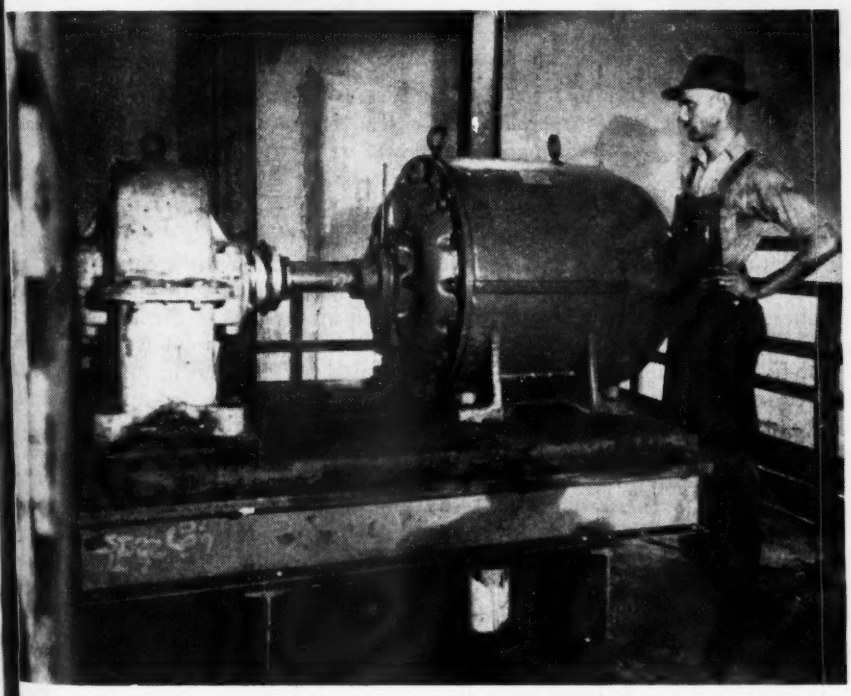
**Metallurgical coal is cleaned on 16 coal-washing tables.**

The settling tank is provided with a scraper-type conveyor fitted with 10-in. channel flights 8 ft. long, the conveyor operating at a speed of 4 f.p.m. The slow conveyor velocity was established to reduce the turbulent effect in the water where the finer particles are settling. The location of the conveyor was established at a depth of 10 ft. below the overflow weirs to provide a quiet body of water above the particles accumulated in the conveyor for discharge.

After crossing under the overflow weirs, the conveyor drags the settled fines up an inclined surface to the end of the conveyor, where the material is discharged into the metallurgical coal elevator above the water line in the elevator sump. This assures removal of the fines with no possibility of recirculating back into the settling tank.



Steam coal (plus $\frac{7}{16}$-in.) is washed in this air-pulsated jig at Praco.



J. P. Sumner, washer foreman, checks the operation of the 48-in. mine-run belt in the room over the silos. The belt is driven through a reducer by a 100-hp. 440-volt motor.

The metallurgical coal prepared in the table plant is delivered to the washed-coal elevator through flumes installed on a pitch of 1 in. per foot. This pitch has been found sufficient for moving the coal with the water normally discharged from the tables with the coal. Previous experience developed that flumes with $\frac{3}{4}$-in. to $\frac{7}{8}$-in.-per-foot pitch were too flat and required the addition of fresh or circulating water to move the coal.

## Jig-Middlings Settling Tank and Middlings Elevator

The underflow from the washed-coal dewatering screen and the middlings from the table plant are flumed to the middlings elevator sump provided with a settling tank of the same size and design as the settling tank for the metallurgical coal. The combined water for the jig and middlings comprises a volume of approximately 5,000 g.p.m., or 675 c.f.m. The upward current velocities in the settling tank increase from approximately 2.8 f.p.m. to approximately 4.75 f.p.m. and, as would be expected, somewhat coarser particles are lost in the overflow from this settling tank. Since the material in this settling tank is normally higher in ash, the carbon loss is not great.

After the washery and table plant have been shut down at the end of each shift, the settling-tank drag conveyors are operated 30 minutes to an hour to remove the materials that settle during that time. The metallurgical materials are delivered to the metallurgical storage bin and the middlings are delivered to the middlings bin.

## Table-Plant Refuse

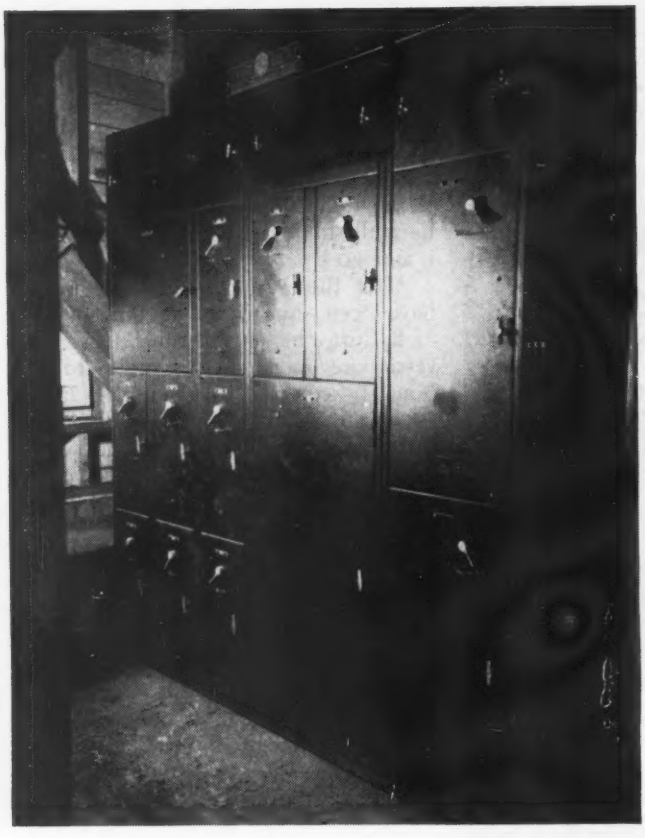
The refuse from the table plant is delivered by flumes installed on a pitch of $1\frac{1}{2}$ in. per foot to a Luhrig-type elevator and sump similar to and approximately the same size as the middlings elevator and sump. No settling tank was provided, since the materials that would be recovered would be extremely high in ash and without salvage value. The elevator delivers the refuse to the 30-in. refuse belt provided for delivering washery refuse from the jig elevators to the refuse-disposal system.

All the elevators, including the metallurgical coal elevator, the middlings elevator and the table-plant-refuse elevator, are provided with fixed wedge-wire sieves in the discharge chutes. These sieves remove sufficient water to permit easy handling of the products. We have found by experience that where fixed sieves are not provided in the discharge chutes sufficient water is discharged with the materials to interfere with loading of railroad cars and with conveying of the material on refuse belts or other types of conveyors.

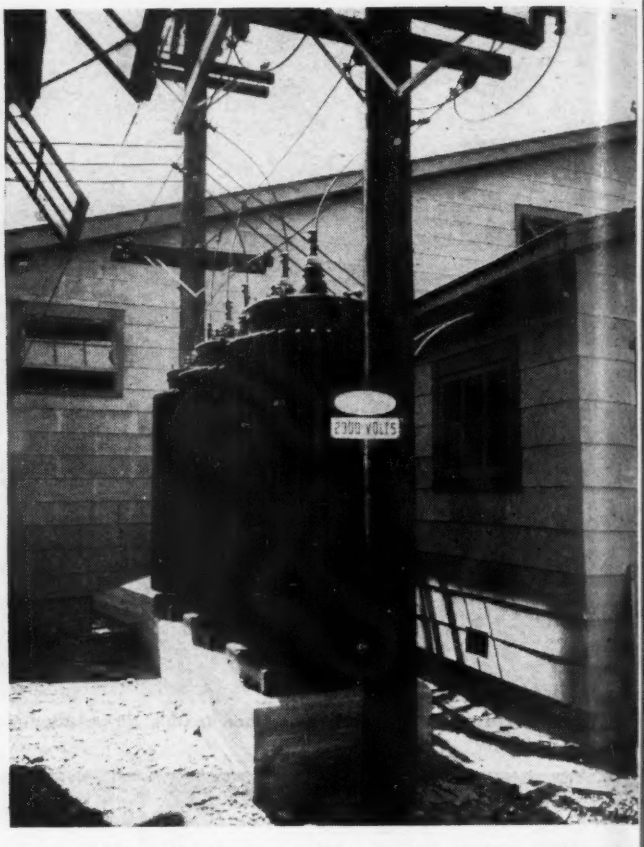
## Refuse-Disposal System

The waste products to be disposed at Praco consist of mine rock, hand-picked refuse and washery refuse.

The mine rock is delivered from the rotary dump by means of an apron feeder and 42-in. belt conveyor (135 ft c.-c.) to a small surge hopper with a capacity of approximately 100 tons. The hand-picked refuse, comprising large shale and rock, timber, cap boards, etc., is delivered from the preliminary screen house to the same surge hopper by means of a 30-in. belt conveyor (165 ft. c.-c.). These two products are passed through a



One of the motor-control units in the Praco plant. This unit, located in the dumphouse, starts and stops ten motors by magnetic switches.




Three 500-kva. transformers reduce the voltage from 2,300 to 440 for preparation-plant motors. A switch house at the right contains 440-volt air-break switches.

15x24-in. jaw crusher with a capacity of approximately 50 tons per hour for reduction to 6 in. and under. Large slabs occasionally encountered in mine rock are bypassed around the crusher over a 12-in. bar screen. These large slabs are accumulated during the day and disposed of by truck as it becomes convenient to do so.

### Belts Best for Disposal

Considerable time and study were devoted to the method to be employed in disposing of the waste products on the gob pile, the only accessible location for which is a valley between two ridges approximately 150 ft. higher than the washery. In this particular instance our study developed that an aerial tram would provide a reasonable disposal cost but involved a higher capital expenditure. A slope hoist for delivering the materials to the top of a hill and an electric larry for disposal at the top of the hill resulted in a higher disposal cost but somewhat lower capital expenditure. Belt conveyors offered all the advantages of low maintenance and disposal costs and a lower capital expenditure.

Two 24-in. belt conveyors on 388-ft. centers have been installed for delivering waste products to a small bin at the top of a hill. The washery refuse is discharged onto the first refuse-disposal belt directly from the 30-in. washery refuse conveyor. The 24-in. belt passes under the jaw crusher where the crushed mine rock and picking-table refuse join the washery refuse for final disposal.

At the top of the hill the combined waste products are delivered to the gob dump through semicircular sheet-steel troughs employed as flumes, in which water at the rate of 500 to 1,000 g.p.m. is pumped for conveying the refuse. Experience with this type of disposal is limited. However, preliminary figures indicate that 150 tons per hour of refuse can be delivered on a pitch of 2½ in. per foot with approximately 500 g.p.m. At times when the water is available, pump facilities have been provided for delivering, 1,000 g.p.m. and it is anticipated that with that volume of water the refuse materials may be flumed on a pitch of 1½ in. per foot.

When the washery is working at its peak capacity of 550 tons of raw coal feed per hour, it is anticipated that the combined mine rock and washery refuse will total 150 to 200 tons per hour. The combined refuse averages approximately 90 lb. per cubic foot and the speed of the belts has been established at 350 f.p.m. to provide the required capacity and reduce the total belt tension to the minimum possible.

A small bin with a capacity of approximately 100 tons has been provided at the top of the hill for emergency use, approximately 100 tons to be used for emergencies in case of failure of one of the pumps delivering water to the refuse flumes. This bin is provided with an electrically operated undercut gate and in case of pump failure, trucks may be employed for disposing of the refuse temporarily until the water supply has been restored.

### Water Moves Refuse

All the washery waste water from the metallurgical and jig settling tanks and also from the table-refuse sump and the drainage from the washed-coal bins is accumulated for delivery to the refuse flumes. It is anticipated that this flume normally will average about 350 g.p.m., which volume is supplemented by fresh water from the main reservoir, the total volume pumped depending upon the season of the year and the water supply available.

With the slope hoist and larry system of the old plant eleven men were employed for refuse disposal in the two operating shifts. With the refuse

belts only one man is employed per shift. The total connected load on the refuse-disposal system is 60 hp. on the refuse belts and 150 hp. on the pumps.

## Washery Performance

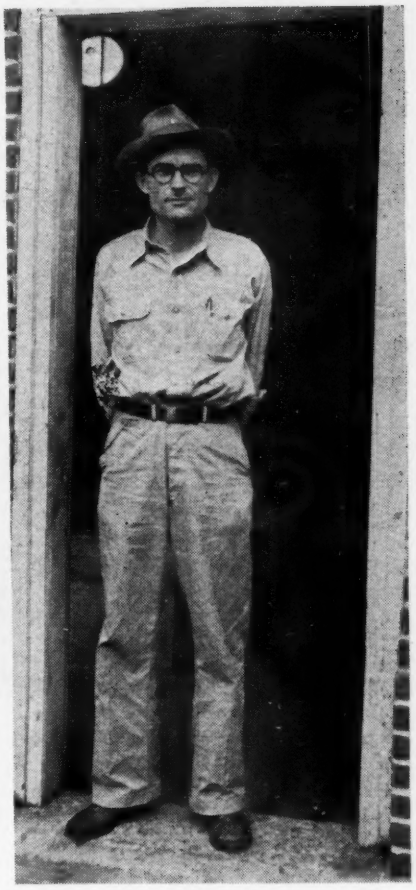
The previous washery at Praco was fitted with four single-cell Montgomery (mechanically operated) jigs and twelve tables. Practically no storage facilities were available (except for metallurgical coal) and the high rate of feed to the washery overloaded both the vibrating screens and jigs, resulting in poor over-all operating efficiencies. The total production of washed coal comprised approximately 40 percent metallurgical sizes and 60 percent steam sizes.

The Mary Lee seam at Praco has exceptional value as a metallurgical coal, and sink-and-float studies indicated that a greater percentage of metallurgical coal was available with adequate preparation facilities. The seam is very friable and the sieve analysis indicated approximately 40 percent steam sizes (plus $\frac{7}{16}$-in.) and 60 percent metallurgical sizes (minus $\frac{7}{16}$-in.).

The Mary Lee seam has two pronounced peculiarities which have proved consistent throughout the district: (1) The float ash at any washing gravity decreases with the size of the coal; (2) very little ash is freed when the coarser particles are crushed. Many attempts have been made to increase the percentage of metallurgical coal by crushing the coarser particles, but the increase is secured only at the expense of increased ash in the metallurgical coal, together with an increase in the quantity of bone coal which predominantly comprises the coarser sizes, not as laminations in those sizes but as inherent ash permeating the individual particles. When the coarser sizes are crushed the individual crushed particles are still bone, and substantially no removable ash is freed by the crushing process.

### Bone Causes Coke Fractures

By a study of the coke structure at the byproduct plant, our research department traced the fractures to this bone coal, which was found to fracture the coke to much the same extent as shale particles of similar sizes. This characteristic of the Mary Lee coal was recognized in the design of the new washery and all crushing equipment was eliminated except one single-roll crusher for the reduction of plus 5-in. lumps to minus 5-in. Since the plus 5-in. lumps comprise 10 percent or less of the run-of-mine, the crushing now being done is of minor consideration.



**H. J. Hager, superintendent, Praco mine, in the door of the slope hoist house.**

The performance of the plant so far has borne out previous sink-and-float studies and sieve analyses, which indicated that a greater percentage of metallurgical coal was available by highly efficient screening and sufficiently rough handling of the run-of-mine to the extent that the small percentage of softer lumps containing less inherent ash are subjected to sufficient impacts and attrition to be reduced to metallurgical sizes without resorting to mechanical crushing, which results in contamination of the metallurgical coal with undesirable bone particles. For that reason run-of-mine stored in the main storage and blending bins and considerable degradation of the low-ash lumps is secured by that means.

The washed-coal products so far shipped have averaged 60 percent metallurgical coal and 40 percent steam coal, representing a substantial increase in metallurgical sizes with only a slight increase in ash over previous analyses. This slight increase, however, is due to the increased quantity of $\frac{7}{16}$x$\frac{7}{16}$-in. in these sizes, and by reducing the table feed from $\frac{7}{16}$x0-in. to $\frac{3}{8}$x0-in., metallurgical sizes can be produced with an ash content equal to or less than previous analyses.

The solids in the jig and table-plant circulating water systems are materially reduced from previous concentrations, and the quantity of solids lost in the washery waste water also has been substantially reduced, as indicated by grab samples. Complete figures will not be available until a more comprehensive study has been made, but this study will be deferred until the washery has reached its peak capacity. Whereas in the previous plant excessive quantities of carbon—approximately 50 tons per day—were lost in washery waste water, such losses have been almost entirely eliminated in the new washery, rendering the investment in the settling tanks a highly profitable one.

The Link-Belt Co., as previously stated, furnished most of the machinery and equipment for the plant. Other important items not previously mentioned are a mine-rock crusher by the Good Roads Machinery Co.; a plate feeder under the refuse bin by the Montgomery Coal Washer Co. and the two refuse belts by the Stephens-Adamson Co. Speed reducers between motors and equipment items are Link-Belt, with the exception of three of Jones make, one on the auxiliary or dump hoist and two on the refuse belts. Side sheaves on the slope haulage curve out by the portal were made by Steward Machine Co. and have SKF roller bearings.

### Line-Start Motors Used

With a few exceptions electric motors are Westinghouse 440-volt CS line-start units. The starting of all motors is handled by General Electric Cabinetrol units at different points in the plant. Power for the 440-volt motors is stepped down from 2,300 volts by three General Electric 500-kva. single-phase Spirakore transformers. All power and light wiring is in rigid galvanized conduit.

A Goyne 3,000-g.p.m. pump moves water from the settling-tank overflow sump to the tables. Two others of the same make and rated at 1,000 g.p.m. each are installed in tandem to pump water from the same sump to the end of the belt conveyors at the hilltop for sluicing refuse. One of these pumps is half way up. An American Well Works 5,000-g.p.m. pump in the basement of the jig washery supplies circulating water for the jig.

Praco plant is located in a narrow valley between two hills with just sufficient space for a public road, railroad and plant. The watershed above

the plant is such that during heavy rains a considerable quantity of water flows through the valley. It was, therefore, necessary to construct a 6-ft.-square concrete culvert for the entire length of the plant to prevent inundation and provide adequate drainage. All foundations for plant structures were carried to solid rock which is 6 ft. below ground level. The structures, bins, etc., were then either completely finished in concrete or raised to the floor level in concrete.

Priorities could not be secured for steel buildings and structures so they were built with southern short-leaf pine, of which 1,000,000 b.ft. was used. All of it, including the 1-in. roof sheeting and siding, is protected from rot by Osmose treatment, applied by a special plant built for that purpose on the site. After being sprayed in an automatic handling machine the lumber was kept in covered piles for 40 to 90 days, giving the chemical time to penetrate by osmosis. Sawed ends of fitted timbers were painted with Osmoplastic. Roofs are covered with composition shingles and the sides with asbestos shingles.

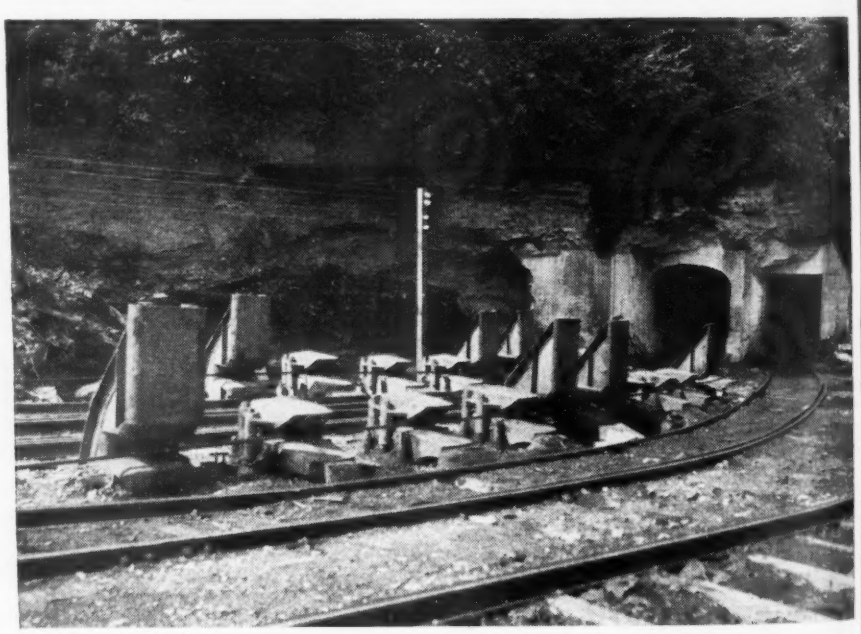
The general arrangement of the plant was fixed by M. E. Haworth, chief mining engineer for the Alabama By-Products Corp. However, part of the plant was designed by the Link-Belt Co., which furnished most of the equipment. Erection was done by the Alabama By-Products Corp. with local labor. H. J. Hager, superintendent, Praco mine, was in charge of construction.

**Lumber-treating plant where 1,000,000 b.ft. of lumber and timber for the new Praco plant was sprayed with preservative prior to piling and curing for 60 to 90 days. Lumber was received in the rear of the treating plant shown here. As it ran through, it was sprayed on four sides. Coming out of the plant on rollers, it struck limit switches, causing chains to start and move it to the loading track. Piled under roofing paper at the right is a batch of sprayed lumber being cured.**

## Samples Promote Uniformity

Uniformity of coal for the manufacture of coke being important, samples are taken throughout the day of the run-of-mine coal, raw coal after blending, washed table coal, washed steam coal and coal from the railroad cars. Samples also are taken of the table and jig refuse. Analyses of these samples are made at the company laboratory, under the direction of W. M. Mobley, chief chemist and director of research, at the byproduct coke plant (see p. 85 of this issue).

The process of washing Mary Lee coal with Simon-Carves jigs and tables is not new to the company, as it has such installations at other mines. Because of the importance of producing the highest quality coke, the company feels justified in the erection of the Praco plant, where the blending and washing processes will produce better, more uniform and low-ash coals. The quality of the steam coals also is much better and the operating and maintenance costs are much lower.



**Loaded and empty tracks at the mine portal. Seven roller-bearing-equipped side sheaves 5 ft. apart guide the ropes.**

Besides the Praco operation the company owns and operates five other mines, all of which are equipped to load coal mechanically. Each has its own preparation plant.

In addition to these operations the company owns over 126,000 acres of proved coal land in Jefferson, Walker, Marion and Tuscaloosa counties. It employs over 3,000 persons and is the second largest producer of coal in Alabama.

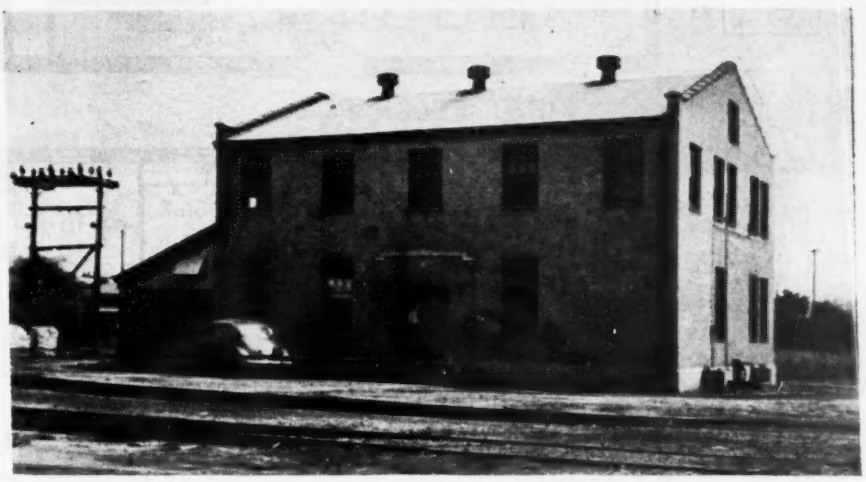
J. W. Porter is president of the company and H. L. Morrow is vice president and treasurer. P. H. Haskell Jr. is manager of coal mines and coal sales and A. G. Overton is manager of the byproduct coke plant.

# QUALITY CONTROL

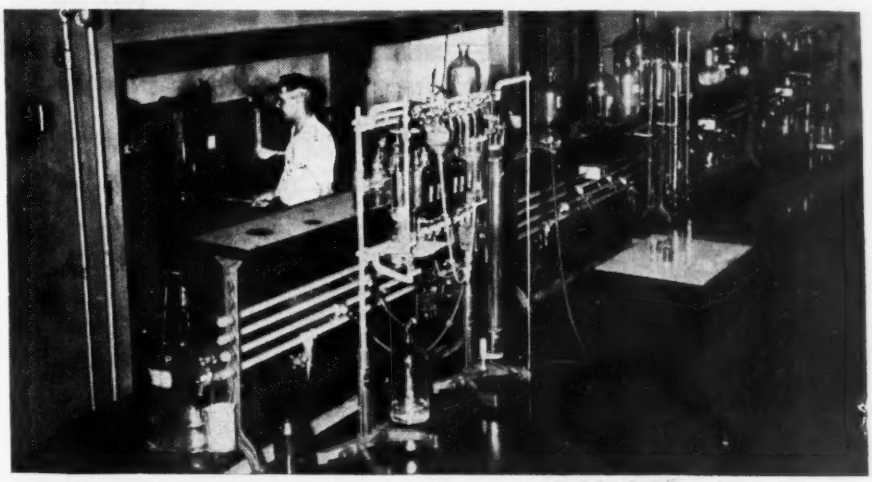
## Assured by New Alabama By-Products Lab

New Central Laboratory Features Fireproof Building and Modern Facilities—With Staff of Twelve, It Handles Control of Coal Preparation and Byproduct Operations and Carries on Research

By J. H. EDWARDS
Associate Editor, Coal Age



Handling control of product quality and research, the Alabama By-Products laboratory is in a new building to one side of the coke and byproduct plant at Tarrant City, five miles from Birmingham.



In the analytical laboratory, W. F. Prosch takes a sample out of a muffle furnace under the hood along the wall. A time switch turns the furnaces on by working time.

WHEN the Alabama By-Products Corp. began work on plans for building a 550-tons-per-hour preparation plant to replace a burned plant of old vintage at Praco, Ala. (see p. 72 of this issue), there was no need for outside help in making up washability curves and no necessity for including in the plans a laboratory for plant control.

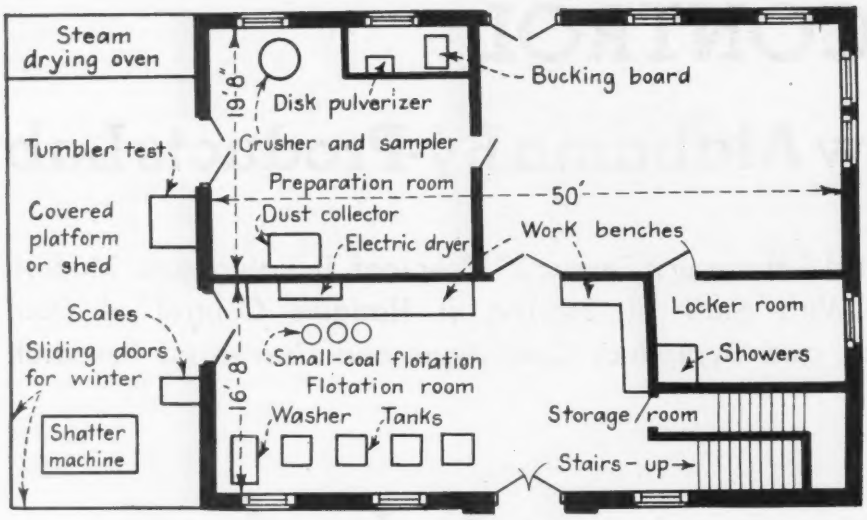
A few months before Pearl Harbor, the company fortunately had completed a new central laboratory for test and research at its byproduct-coke plant at Tarrant City, five miles from Birmingham. Here, in a new fireproof 37x50-ft. two-story brick building with modern equipment, a staff of twelve, including two field men, handles the control for four coal-washing plants and for the byproduct operations, including raw materials and finished products, and conducts research on blending and other problems affecting the products. Heading the staff is W. M. Mobley, chief chemist and director of research.

### Sampling at Washeries

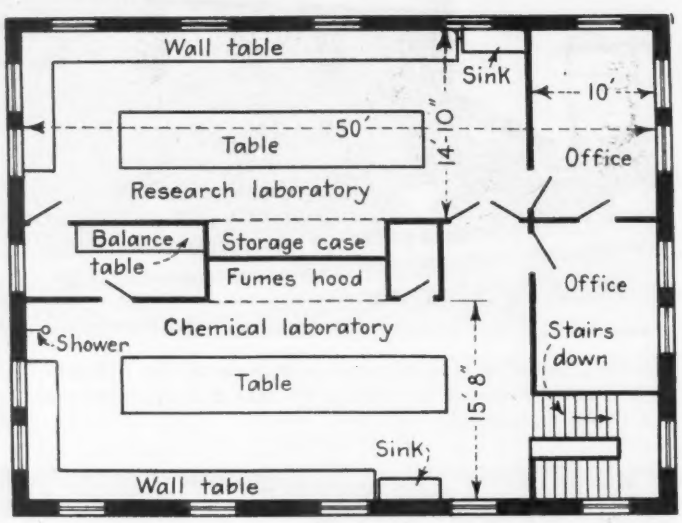
At each of the four byproduct coal washeries, the field men accumulate each day gross samples of about 500 lb. of the minus $\frac{5}{16}$-in.-tables coals and from them deliver 100-lb. fractions to the laboratory. Results of float-and-sink tests on the coals, as well as on samples of raw coal and refuse, are communicated the next day or as soon as possible to the mine superintendents and washer operators. Field men also go underground to take channel samples as mining progresses. Physical testing includes screen analysis and determination of washability from float-and-sink data.

Although supplying a considerable volume of domestic coke, the Tarrant City byproduct plant, consisting of 179 Koppers ovens in four batteries, specializes in the production of foundry and metallurgical coke. To provide the close control necessary, each shipment of coal arriving at the plant is sampled and determinations are made for moisture and proximate analysis, including sulphur.

Two of the company's mines produce steam coal ($\frac{5}{16}$x4 in.) and from these the field men get samples at least once each week and tests on them include determination of heating value (B.t.u.). There is one exception to the sizes mentioned. From one mine, a minus 3-in. coal is shipped to the byproduct plant, where it is crushed and mixed with the coals from the other four plants. Approximately 50 percent of the laboratory effort is expended directly

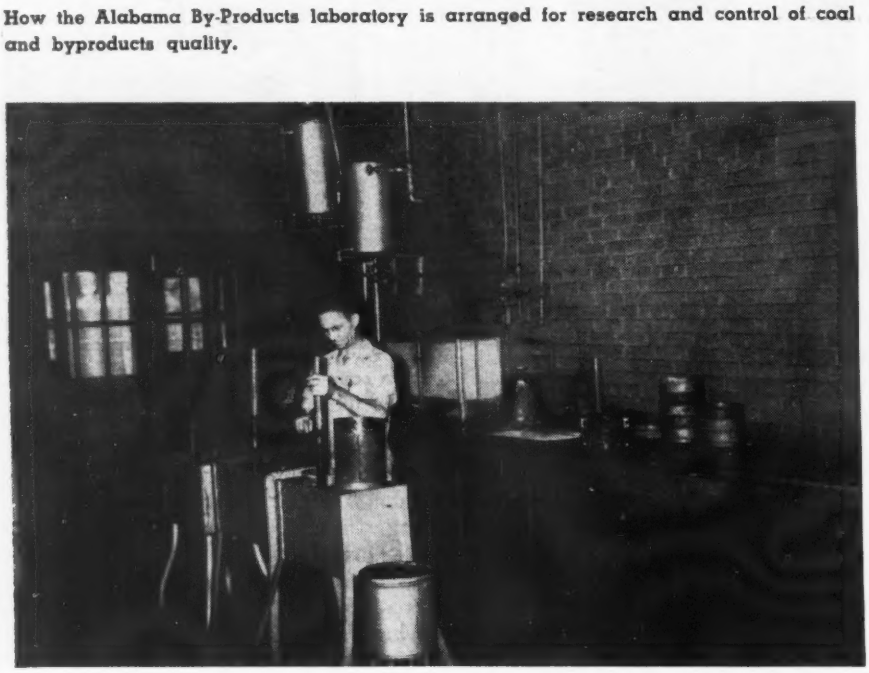



FIRST FLOOR PLAN




SECOND FLOOR PLAN

**How the Alabama By-Products laboratory is arranged for research and control of coal and byproducts quality.**



**O. T. Payne works with the fine-coal flotation tanks. In the background are the water still and fine-coal drying ovens.**

on coal. In addition to the field men, the laboratory crew consists of four sample preparation men, five chemists and one clerk.

In the blending of coals, the proportions are varied to suit the grade or type of coke wanted. Ash-fusion tests are run on the coals and on domestic coke. Physical tests made on the coke include shatter, tumbler, porosity and combustion and burning rate. In a separate building to be under the supervision of the laboratory personnel, the company is now installing a 27-in. cupola for testing foundry coke under full-scale operating conditions.

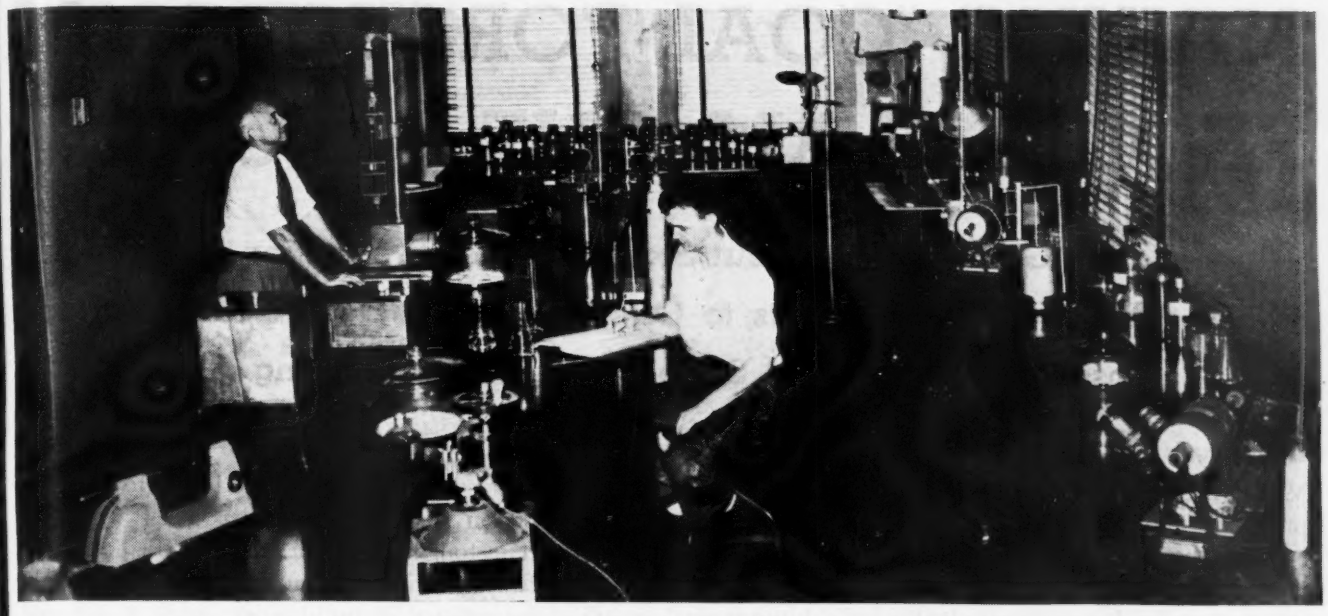
In addition to the coke, other principal finished products that the laboratory must control are tar, ammonium sulphate, gas and refined oils (benzol, toluol, xylol and solvent naphtha). Blending qualities of the coals as affecting the physical characteristics of the coke have been the subject of extended research.

## Sample Preparation

A steam drying oven, scales and two machines for testing strength of coke (tumbler and shatter) are installed on a covered platform to which trucks deliver samples. Equipment in the preparation room on the first floor of the laboratory building proper consists of a crusher and sampler and a disk pulverizer (both Sturtevant made). To the crusher and sampler the company has added a pipe connection with water sluicing to carry the reject fraction to a collection area on the ground outside the building. This arrangement, together with a dust collector to the exhausting hoods over the crusher and disk pulverizer, keeps the room practically free of dust.

The flotation room, also on the first floor, has four rectangular tanks, a basket and a washer built on U. S. Bureau of Mines specifications. An I-beam with trolley and chain block was installed so that one man can handle the basket easily and safely. For the small sizes of coal, three round float-and-sink tanks of local design and make are located in the same room. Gravities of zinc-chloride solutions in the four large tanks are maintained at 1.40, 1.45, 1.50 and 1.60. A drain trench 6 in. deep was installed in the floor along the center of the room and the floors on each side slope gently to it. This trench is covered with cast-iron gratings which are removable for cleaning. The arrangement is preferred to a pipe drain, which would not be so easy to clean if clogged.

Electric dryers are installed on a bench in this same room to dry the



**General view of the research laboratory. W. F. Mobley, chief chemist and director of research (left), is making an agglutinating test while J. G. Fulmer is working on the fractional distillation of oil.**

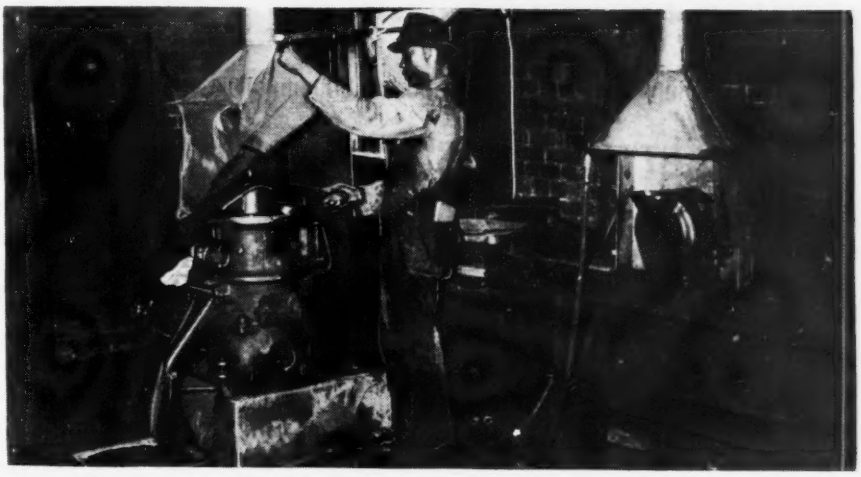
floats and sinks from the small flotation units. Here also is located the still furnishing pure water for laboratory use and for cap-lamp batteries.

Tops of the center tables in the research and chemical laboratory rooms on the second floor are custom built of Kenweld, which is unaffected by most chemicals and has considerable resiliency. Sinks in the tops of the research-laboratory center tables are of the disappearing type and all service outlets for electricty, air and gas are on the aprons. The sinks are Karcite—Kewanee (Wis.) Mfg. Co.

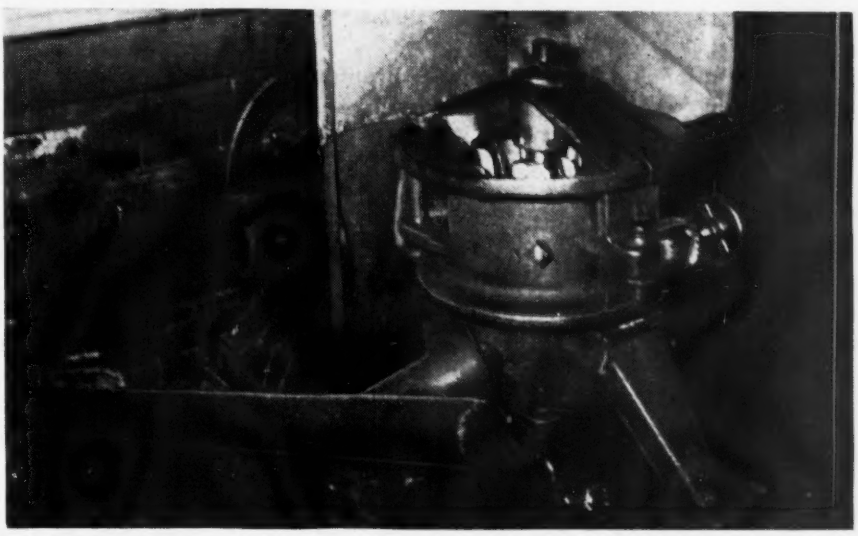
A separate room is provided for the balances—three in number. In the chemical laboratory, a hood is provided along one side for collecting fumes. Under it are four electric muffle furnaces fitted with pyrometers. The furnace control rheostats are in a cabinet below the hood and a time switch brings the furnaces to operating temperatures by work time.

Other furnace equipment includes units of the combustion-tube and crucible types. Pyrometers of the indicating, recording and optical types are employed. Gas analysis is done with Burrell apparatus and heating values are determined with a Parr oxygen-bomb calorimeter. The laboratory includes all the necessary equipment for routine and specialized tests and analyses.

With the building on one side of the property, 100 ft. from the closest structure and designed with a generous number of windows, rooms are airy and light. Building, equipment and surroundings all are conducive to the careful work necessary in laboratory control and research.



**In the receiving shed—rotary fine-coal crusher at left and disk pulverizer at the right. Exhaust hoods and pipes lead to dust collector.**



**The rotary crusher is provided with a pipe and water connection (lower left) to sluice the discarded portion of the sample outside and further reduce dust.**

# MAKING "COAL-FOR-VICTORY" REQUIRES ALL-OUT EFFORT

## 1944 Goals in Sight but Slackening of Production Drive Could Hamper Coal's Efforts to Offset Seasonal Decline and Holiday Losses—All but Three States and Alaska Running Ahead of '43

With three exceptions, every State in the Union is producing more coal than in 1944. In some, the increase is only slight; in others, it is as much as 25 percent, with the averages at the end of the first 32 weeks standing at 7.2 for anthracite and 8.1 for bituminous. It is apparent, therefore, that numerous coal mines, if the present pace can be maintained, will be able to qualify for *Coal Age* "Coal for Victory" awards.

### GETTING TOUGHER

**Despite a summer slump and the loss of almost two full days' tonnage during the July 4 holiday week, coal still is ahead in its drive toward 1944 production goals. But the summer drop and the July 4 holiday almost cut in half the backlog which both anthracite and bituminous had accumulated in the first half of the year. At the end of 32 weeks, the standing was:**

| | Quota | Produced | Backlog |
|---|---|---|---|
| Bituminous | 384,600,000 | 389,530,000 | 4,930,000 |
| Anthracite | 40,000,000 | 40,364,000 | 364,000 |

**Calculations are based on requirements of 626,000,000 tons, or 12,050,000 per week, for bituminous, and 65,000,000 tons, or 1,250,000 per week, for anthracite.**

**Thus the summer decline and the July 4 holiday left bituminous with a backlog of a little more than two days' production, and anthracite with less than two days'. Labor Day, Election Day, Thanksgiving, Christmas and other holidays are still to be reckoned with. Any one of them could cut the backlog in half. Even a minor work stoppage could wipe it out altogether. Meeting the goals consequently requires producing at better than the average rate from now until the end of the year.**

But that does not mean that the battle to meet the 691,000,000-ton quota for 1944 has been won. Far from it. The toughest part of the job still lies ahead. In fact, coal lost a little ground in recent weeks as the result of the seasonal slump in orders, while it still must reckon with the effects of the holidays to come and with a tendency to slacken off on the yet-to-be-realized idea that the war is almost over.

To operators and supervisors sincerely trying to meet production goals and thereby earn the gratitude of the nation, in addition to the "Coal for Victory" production or efficiency awards, these factors present difficult but not insurmountable problems.

Any one of the remaining holidays, such as Thanksgiving, Christmas or others, can result in a loss of 2,000,000 tons or more of bituminous and 200,000 tons of anthracite. These and other losses must be offset by increased production in the remaining working days of 1944 and by employment of every possible method of increasing efficiency. Meeting the goals obviously will require production at rates substantially over 12,000,000 tons weekly for bituminous and 1,250,000 tons for anthracite to compensate for holidays and emergencies. Added production also is necessary to make up the loss in tonnage which followed the summer drop in orders.

### Large Tonnages Still Necessary

In the realm of speculation on the end of hostilities, competent observers see no sudden decrease in the demand for coal even though the war with Germany should end quickly. A cut-back in some war industry will be ordered but coal still will be needed for finishing the war with Japan, which will continue to require maximum effort in the fields where coal is needed most—steel, munitions and heavy manufacturing; for helping liberated nations; and for meeting the heavy demand for civilian goods in this country.

Analysis of percentage increases by States in the first 30 weeks of 1944 shows the Middle West with generally the best record, with western Kentucky leading the nation. Several Far Western and Southern States also stood high in the list, along with Pennsylvania and northern West Virginia. In most of Districts 7 and 8,

# TONNAGES

## HOW COAL STATES STOOD AT END OF FIRST 30 WEEKS OF THE 1944 PRODUCTION DRIVE

| STATE | PERCENT GAIN OR LOSS FROM 1943 | STATE | PERCENT GAIN OR LOSS FROM 1943 | STATE | PERCENT GAIN OR LOSS FROM 1943 |
|---|---|---|---|---|---|
| Alabama | 13.2 | Kentucky—East | 5.7 | Pennsylvania (anthracite) | 8.4 |
| Alaska | —7.5 | Kentucky—West | 25.0 | Tennessee | 11.0 |
| Arkansas, Oklahoma | 5.7 | Maryland | 4.9 | Texas | —13.2 |
| Colorado | 4.2 | Michigan | 8.8 | Utah | 11.9 |
| Georgia, North Carolina | 0.0 | Montana | 1.0 | Virginia | 3.1 |
| Illinois | 10.3 | New Mexico | 1.9 | Washington | —5.3 |
| Indiana | 14.2 | North and South Dakota | 11.9 | West Virginia—South | 2.0 |
| Iowa | —13.9 | Ohio | 6.0 | West Virginia—North | 18.4 |
| Kansas, Missouri | 4.9 | Pennsylvania (bituminous) | 13.8 | Wyoming | 2.5 |

Based on current weekly production figures of the U. S. Bureau of Mines. Because of a variation in reporting methods, these percentage figures run slightly higher than the cumulative average for the country.

however, the record was less favorable and the situation continued tight with no prospect that the demand for the smokeless and metallurgical coal produced in those districts would decline. Only three States and one Territory, none of them large producers, showed a drop from last year's figures. These were Iowa, Texas, Washington and Alaska.

Study of the production record to date shows very definitely that the problem of meeting 1944 goals is yet to be licked. Tonnage and wartime requirements are in such delicate balance that even a very slight hitch could put the country in the red. But with the determination and skill which the industry and its employees have already shown, there is a chance that the goals can be met. But complacency or overoptimism can cause a bigger loss of tonnage than holidays or disputes. The goal is in sight. By making sure that it puts forth its best effort, coal can reach it.

## About the "Coal-for-Victory" Awards

*Coal Age's* "Coal for Victory" awards, presented with the support and cooperation of the Solid Fuels Administration for War, are offered as an incentive to greater wartime production, as a recognition of the contributions of the coal industry to the war effort, and as a stimulus to permanent improvement of mining methods.

Two awards are offered. The Victory Production Award will go to mines or collieries which increase their fresh-mined output in 1944 by 6½ percent or more over 1943. The Production Efficiency Award will go to mines or collieries which increase their fresh-mined output per manshift by 10 percent or more. Mines or collieries having a War Production Board serial number and in production in 1943 and 1944 are eligible for either or both of the awards. Similar awards will be made to each member of the supervisory staffs of the winning mines.

*Rules and conditions* are available from *Coal Age* in reasonable quantity at no cost.

*Application blanks*, which will be short and simple, will be mailed to all mines in ample time to permit their being returned before the deadline on Jan. 31, 1945.

*Judges* will be announced in the October issue of *Coal Age*.

*Badges* are being designed for winning mines which wish to present them to all their employees. *Coal Age* is completing arrangements to make them available at cost.

*Other information* will be published in the columns of *Coal Age* as it becomes available.

# MECHANICAL LOADING
## Proves Its Advantages at Clear Creek Mine

### Track Loader and Top Cutter Installed in 1938—Clear Creek Now Completely Mechanized, Reducing Roof Trouble and Providing a Cleaner Coal—Output per Manshift 12.5 Tons in December, 1943

OPERATING AT an elevation of 8,300 ft. on the Wasatch Plateau in western Carbon County, Utah, the Clear Creek mine of the Utah Fuel Co. now has behind it several years of experience to prove the benefits of intelligent choice and efficient application of modern mechanical-loading equipment. Clear Creek was opened in 1899 and until 1939 the coal was loaded by hand. The production cost was so high that it was practically prohibitive, and at one time serious consideration was given to the closing of the mine.

The coal is 7 to 8 ft. thick and it had been the practice to mine the entire seam. Under this system the roof was difficult to hold and timbering costs were high. The general dip of the seam averages about 2 percent in a westerly direction, but local rolls are frequent and unpredictable. Short pitches as steep as 10 percent have been encountered.

**Track loader at work on a fall in Clear Creek mine. Top cutting has eliminated the major part of the roof trouble previously encountered.**

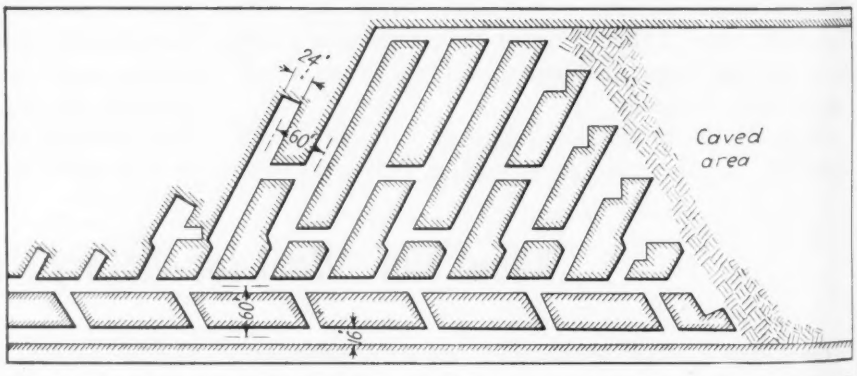



**Fig. 1—The Clear Creek mining plan is based on retreat operation with pillars extracted as soon as rooms are driven up.**

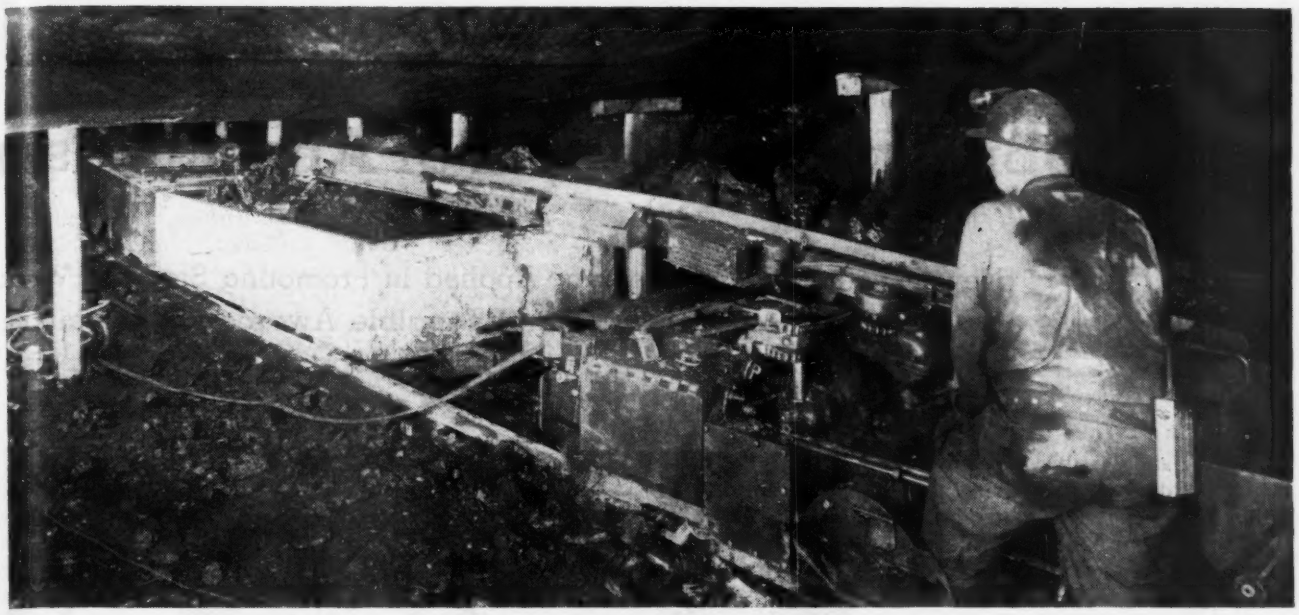
### Band Fixes Working Plan

The mine is a drift operation with a maximum cover of approximately 800 ft. Slopes are driven easterly up the true pitch of the seam and room entries take off north and south along the strike. The roof is shale and when top coal is left stands up well. The immediate floor is a thin layer of soft clay. The seam contains a 1- to 2-in. rock and clay band about 1 ft. below the roof and which more or less determines the method of mining.

In 1938 it was decided that by top cutting under the rock band a cleaner and more marketable product could be obtained. It was felt that this, coupled with the choice of the right kind of track-loading equipment, would transform the mine into a successful mechanical loading operation. A Goodman 360 track loader and an 8-ton Goodman cable-reel locomotive, in combination with a Sullivan 7AU top-cutting and shearing machine, were installed in 1939. At the same time the main haulage road was laid with 50-lb. rail and large, low, compact solid-bottom steel cars, with an overall height of only 36 in. but nevertheless a capacity of 164 cu.ft., were installed.

It was found that by leaving about 8 in. of top coal much of the trouble formerly experienced with the roof could be eliminated, and now not more than 7 ft. of the coal is mined. The work is concentrated and pillars are not permitted to accumulate. As soon as a room is completed the pillar immediately is extracted. Rooms are turned on an angle of 60 deg. and are driven 22 ft. wide on 60-ft. centers for a distance of 340 ft. Entries are driven 16 ft. wide on 60-ft. centers. Pillars are mined by driving places 22 ft. wide at an angle of 60 deg. on the open end, and no attempt is made to recover the timber. Approximately 58 percent of the production comes from pillars, 30 percent from rooms and 12 percent from entries. By extracting the pillars as soon as the rooms are completed large open areas are avoided and extraction is completed before the roof becomes troublesome.

Because of the irregular grades it sometimes is necessary to change the



**Loading machine discharging to one of the new low-type steel mine cars. In the background is an 8-ton service locomotive.**

plan of mining. Generally, however, the entries are first driven to the boundary and the rooms are mined on the retreat as shown in Fig. 1. Cutting, drilling, loading and shooting is a continuous operation. The pillars are removed as quickly as possible after the rooms are finished and since more than half of the coal is produced from pillars it is necessary to cut the pillars more frequently than the rooms. Eight to twelve falls per shift are loaded by each unit and an average of five to seven of these falls must be loaded from the pillars. By cutting the pillars two and three times each shift they are removed quickly and the rapid retreat eliminates roof trouble.

A third 7AU track cutter was added in the early part of 1944. At present, two cutters are worked on the day shift and two on the night shift. They each average about seven places cut and drilled per shift. The third machine will be used as a spare and to augment the regular cutting units whenever the demand warrants it.

Each loader operates in a separate section and is served by two 8-ton cable-reel locomotives. While one locomotive is serving the loader the second locomotive takes a trip of five cars (about 25 tons) to the parting and returns with an empty trip ready to take its turn behind the loader. Using a 13-ton trolley locomotive, the loads are hauled from the inside parting, in ten-car trips, a distance of 3,300 ft. to a parting at the top of a 5-percent grade. The loads are picked up from the parting at the top and dropped a distance of 4,400 ft. to another parting. From the bottom of this incline another 13-ton trolley locomotive hauls the ten-car trips 3,500 ft. to the tipple near the mine portal. The main rope road passes through a badly faulted zone where in several places it has been necessary to line the entry with concrete to support the roof and sides. The grades are quite irregular and in places it is necessary to gain considerable speed on the downgrades to provide the necessary momentum to carry the loads up the hills with sufficient speed to maintain the schedule.

## Additional Equipment Installed

The first Goodman loader proved so successful that a second machine was installed in 1941. In 1942, the demand required a greater production and double-shifting of one loader became necessary. No attempt has been made to establish records for a single day but the goal has been to maintain a uniform rate of production. This has been accomplished by careful planning, good face preparation and excellent car service. During 1942, with two loaders working, one operated two shifts per day, 302,986 tons was loaded in 285 working days. In 1943 the first loader had been in operation for four years and the second for two years, with one machine double-shifted more than a year. During this period both units had operated consistently with only minor repairs.

A third loader was purchased in 1943 so that a spare would be available and thus permit taking the older loaders to the shop one at a time for inspection and repairs. One machine is now kept as a spare, and in 1943 with only two machines operating (one double-shifted, as in 1942), 363,284 tons was loaded in 303 days of operation. This increased tonnage, several times the production obtained when hand loading, has been of material aid to the war effort. In addition to the increased total production, production per manshift for all inside and outside employees at the mine amounted to 12.5 tons in December, 1943, believed to be a record for Utah. Considering only underground employees for this same month, the production was 16.7 tons per manshift.

Concurrently with the installation of mechanical loading, an improvement was made in coal preparation. A rotary dump was installed and increased hand-picking facilities were added. The minus 3-in. coal usually contains most of the clay band. However, in some instances part or all of the band clings to a larger lump. This is hand-picked with other impurities falling from the roof and crushed to minus 3 in. This crushed product, along with the regular minus 3-in. coal, is shipped to Castle Gate, where it is washed, thus eliminating all the impurities derived from mechanical loading. The ability to crush any quantity of the larger sizes containing impurities and wash the resultant product is an integral part of the mechanical-loading program. A first-grade commercial product is obtained with no bottlenecks in the preparation facilities.

Teamwork both in the mine organization and also in a larger way between the operating, engineering, preparation and sales departments is an important factor in the Clear Creek record, and reflects credit on the officials of the Utah Fuel Co. and the members of the various departments of the company.

# "ATTENDANCISM"—

# New Approach to Problem of Absenteeism

## New Psychology Increasingly Applied in Promoting Steadier Work by Miners—Based on Praise and Tangible Awards for Remaining on the Job Rather Than Penalties and Reproofs for Absenteeism

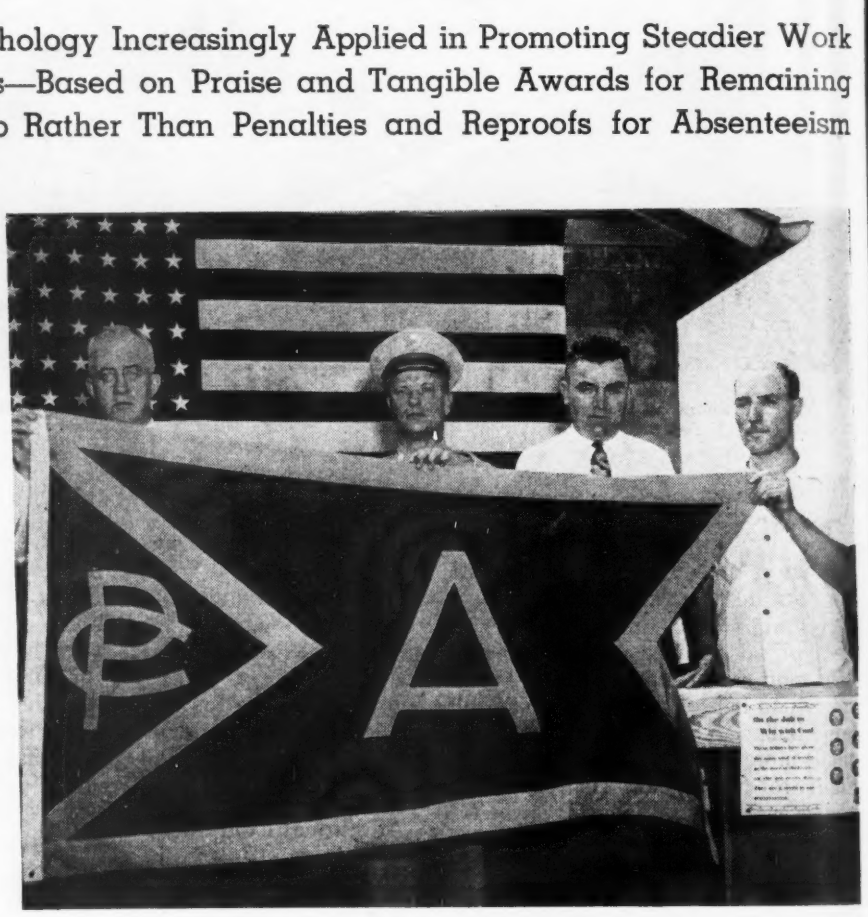
PRAISE and visible evidence of achievement for staying on the job rather than penalties and reproofs for taking time off is the underlying factor in a new approach to the problem of coal-mine absenteeism. The answers to the two questions of "How can we promote attendance?" and "How can we reduce absenteeism?" may add up to the same thing, but there is a significant difference in psychology. It is just possible, in the light of the experience of several organizations, that the positive approach will provide at least part of the answer to absenteeism, especially since most other cures have been at best only partly effective and seldom lasting.

### Positive Approach Used

Among those using the positive approach of singling out faithful workers for praise and awards is the Island Creek Coal Co., including the Marianna Smokeless Coal Co. and the Pond Creek Pocahontas Co. Since March 1 these companies have made awards to inside and outside men. These consist of a white safety cap with a red, white and blue shield on one side and the inscription "Service Award" on the other.

As the service period grows longer, without loss of a day on which the mine operates, additional credit is given in the form of chevrons for specified periods. The ultimate award (two years of perfect attendance) is a silver bar attached to the cap. These awards, in the words of J. J. Foster, assistant to the vice president and general manager, will honor "the workers who earn them as regular workers deserving of special credit for their contribution to our war effort."

In Ohio, the Hanna Coal Co. awards employees who work 60 days or longer without losing time red, white and blue, badges similar to the ribbons worn by service men. For each additional 60-day period without absence, a silver star will be attached to the badge.



**Management, the armed forces and labor join in presentation of the first "A" pennant to Montour No. 9 mine of the Pittsburgh Coal Co. Left to right are J. B. Morrow, Pittsburgh Coal Co. president; Lt. Col. Robert C. Downie, Pittsburgh Army Ordnance District; John Dresmitch, international board member, District 5, United Mine Workers of America; and Paul Toulouse, vice president, U.M.W.A. local No. 3436.**

Victory committees in each Hanna mine certify the eligibility men, and company officials, usually the mine superintendent, see to securing the badges and placing them on the lapels of the recipients. About 850 men, according to the July issue of the Hanna Coal News, were eligible for badges at that time, and an increase was expected in the next 60-day period.

Awards to entire mines feature the plan of the Pittsburgh Coal Co., which inaugurated the "A" (for attendance) program in July. The awards consist of pennants presented to the three top-ranking mines. These pennants are similar to those issued with the Army-Navy "E" award. First rank is recognized by a blue pennant with orange letters and trim; second, white on red; third, blue on orange. Orange and blue are the company colors.

The awards, as stated, are made to the three top-ranking mines and the winners are entitled to fly the pennants beneath the United States flag for a month. Any mine holding top position for three months in a row may retain the pennant permanently.

The importance Pittsburgh Coal attaches to the plan was underscored by the impressiveness of the first presentation ceremony. Management, the armed forces and labor took part. J. B. Morrow, president of the company, made the presentation to Montour No. 9 mine and its employees July 11. Lt. Col. Robert C. Downie, chief of the Pittsburgh Army Ordnance District, was the principal

speaker, emphasizing the importance of greater coal production. John Dresmitch, international board member, District 5, United Mine Workers of America, outlined the coal miners' part in the war-production effort. The award was accepted by Paul Toulouse, vice president, Local 3436, U.M.W.A.

Carrying the positive approach toward promotion of attendance farther—into the home of every employee—R. E. Charlier, industrial relations manager for Pittsburgh Coal, put out a special issue of the P.C.C. News, not only explaining the "A" award but also honoring the individuals with good attendance records at every mine. Pictures and short descriptions of the ten men at each operation and others in the company offices and shops having the best attendance records comprised almost the entire issue. Company officials were surprised to learn that 80 men had not missed a day's work since Pearl Harbor and that some of these had attendance records of many years' standing.

### First Pennant to Montour

In line with the new approach, Montour No. 9 received the initial first-place award on the basis of attendance, rather than on reduced absenteeism. No. 9's attendance percentage was 96.3 in June, meaning an absenteeism of 3.7 percent—almost phenomenal these days in the bituminous fields. Banning No. 1 took second place with 95.3 and Lindley third with 95. Only two of Pittsburgh Coal's 16 mines fell below 90 percent attendance in June and in one case this was due to a short-lived strike. All but three of the company's operations had attendance records better than the industry's national average of 91.1.

Miners with the best records were singled out for special praise in a letter by Mr. Morrow prefacing the special P.C.C. News edition, which carried the legend "In appreciation of employees who have worked steadily on the production front." Speaking especially to men who had worked every day since the war began, Mr. Morrow had this to say:

"This is a remarkable performance. These men have felt the same need for time off that the rest of us have experienced. They have had minor ailments. They have had personal affairs that needed attention and they have had victory gardens to work. But they have managed to do all these things and work safely every day as well. It is not an exaggeration to say that the spirit of such men will bring the war to a speedier conclusion. This special recognition, however, is not intended to detract from the performance of scores of other men or to minimize their efforts in the production army, for we are fully conscious of the fact that many of them lost time for reasons beyond their control."

Concentrating on attendance rather than absence has its root in the psychological effects of an appeal to personal pride and patriotism coupled with visible evidence of appreciation for staying on the job. This approach differs materially from such others as giving war bonds or permitting men with good records to draw for such bonds, which, since men are making more money than ever, often fails to produce the desired result.

Whether the positive approach of concentrating on attendance, rather than the opposite one of wrangling over absence from work, is the complete answer remains to be seen. But this feature appeals to those who have adopted it: it encourages better performance by praising and rewarding accomplishments, and where the record is indifferent or bad it supplies perhaps a better incentive for improving it. But even if the plan should not turn out to be the broadest and best highway to steadier work, it is felt that so far it is not the dead-end street of many other methods that have been tried to increase attendance.

**Badges to which silver stars are added go to Hanna Coal Co. men completing one or more 60-day periods without lost time. At Crow Hollow, McGavoch Curren gets an award from N. M. Lawson while Jack Whelan, Roy Walker and Superintendent J. D. Ireland stand witness.**

**White hats to which are added chevrons and silver bars for increasing lengths of perfect attendance single out employees who work steadily for the Island Creek Coal Co. Here Alva Young and Rufus Workman, electricians, display their new headgear for Jack Berry, superintendent, Mine No. 1.**

# GREAT BRITAIN

## Drives for Greater Coal Production

Great Britain Logical Supplier of Coal for Her Own and Continental Territory for War and Reconstruction Uses—U. S. Equipment and Methods Helping Her in Meeting Demands for More Coal

By IVAN A. GIVEN
Editor, Coal Age

COMPLETING the military campaign in Europe and then helping countries on the Continent make a start on restoration of normal commerce and industry brings up the question of where the necessary coal is to be obtained. This question has been highlighted by the recent visit to Great Britain of a mission of U. S. coal men and economists, headed by A. S. Knoizen, under the aegis of the Combined Production and Resources Board and the Combined Raw Materials Board. The objective of this mission was to assist Great Britain in the use of its own resources and substantial help in the form of U. S. mining equipment and technical advice to turn the production tide in the Isles and insure efficient distribution of the output.

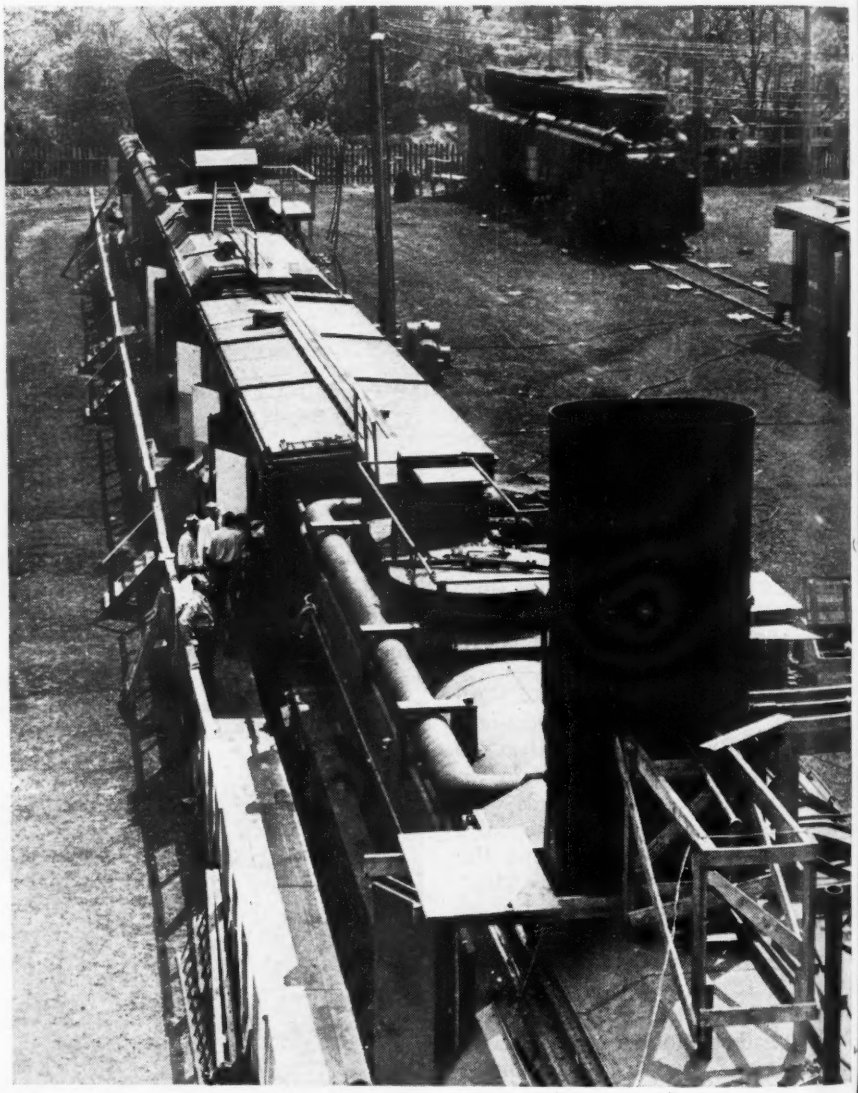
### Shipping a Major Factor

On the basis of source close to the point of need, if for no other reason, Great Britain is the logical country to meet not only its own war needs but also those of the Allies in European territory, as well as the needs of the liberated countries on the Continent and in contiguous territory for war and civilian rehabilitation purposes. One criterion, of course, is most efficient use of coal-shipping capacity.

Logic also dictates the restoration and use, as soon and as far as possible, of the coal-producing facilities in liberated territories and this process already is under way in Sardinia and other areas. But in addition to the military needs of the Allies, it is expected that minimum essential civilian requirements will require shipment of sizable quantities of coal into the liberated areas for at least a time if not for a rather extended period after hostilities cease.

Great Britain, as stated, is considered the logical source of such coal. The mining equipment sent or to be sent to her is designed to substitute for actual coal shipments. In effect, it is the equivalent of exports to Great Britain and other areas that might be served from the Isles on the theory that stimulating output in that country will lighten the burden on already well-loaded U. S. mines, in addition to making the most efficient use of available colliers.

Whether Great Britain, by its own efforts and with the help of the United



**COAL BURNER FOR EUROPE—This steam-powered generator train is designed to supply power in liberated areas where regular generating equipment has been destroyed. With equal destruction of coal-producing facilities expected, Great Britain is looked to for tonnage to tide over reconstruction in addition to war uses.**

# WHAT THE U. S. MISSION TO BRITAIN FOUND

*THE FOLLOWING, cleared and issued through OWI, is a summary of the report of the U.S. coal mission to Great Britain presented to the Combined Coal Committee of the Combined Production and Resources Board and the Combined Raw Materials Board (figures in gross tons):*

American coal-mining machinery sent to Britain is making a major contribution to speeding defeat of the enemy, the coal mission that recently visited the United Kingdom reported today. The mission, comprised of coal-mining technicians and economists from government and industry, was headed by A. S. Knoizen, director of the Mining Division, War Production Board. The mission's report is now being studied in Washington and London.

The mission reported that the British officials are doing an outstanding job in the control and distribution of all solid fuels. Every pound of coal is controlled from the mines to its ultimate burning point. Careful control is exercised over fuels for domestic use and the supply kept down to the barest minimum necessary for the people of Britain.

The mission found that the British are making excellent use of American "strip-mining" machinery for increasing coal production to ease Allied fuel shortages. To hasten victory by increasing British coal production, the United States is sending equipment both for developing new "strip" or "opencast" mines and for mechanizing the old "deep" mines. The mission made a careful survey of the use of this equipment and of other aspects of the British coal situation.

The mission expects that the British will be able to raise the rate of production of "strip" coal from the current 10,000,000 tons a year to 18,000,000 or 20,000,000 tons with the aid of American equipment. This expectation assumes that all American "stripping" equipment now allocated or recommended for allocation will be received and will be put into operation. It was the view in Britain, however, that production at the rate of 15,000,000 tons a year is the most that can be expected in the coming coal year. The total amount of coal that the mission thinks can be mined by this method is from 80,000,000 to 100,000,000 tons.

Because of the shortage of trained men required to install and operate it, a considerable amount of American underground mining machinery has not yet been put into use. The mission recommended, therefore, that future shipments be held up until the British can get the machinery now on hand in operation.

Full operation of all "deep-mine" equipment provided for under the 1944 program, plus a similar program proposed for 1945, should help Britain to increase its underground coal production by approximately 12,000,000 tons per year. Upon completion of the mine training program, expected within the next five or six months, the mission has no doubt that the British mines will be able to put all American coal-mining equipment provided for by the program effectively to work.

Of the 190,000,000 tons current total annual underground production in the British Isles, about 40,000,000 tons could, in the mission's view, be mechanized immediately with American-type equipment. The resultant gain in efficiency and economy of manpower can be a major contribution to the war effort, the mission feels. A large part of the remaining 150,000,000 tons "deep-mine" production can be mechanized gradually after major changes have been made in transportation, preparation and methods of dealing with the difficulties of converting from complete longwall operations to complete room-and-pillar systems of mining.

It must be realized, the mission pointed out, that American equipment will not operate as well in British mines as in American mines. The underground conditions of British mines are different and there are many physical problems that must be solved before American-type equipment can be employed on a large scale.

The British Government is making excellent progress in training personnel, and the Sheffield School for mechanics and electricians will begin turning out trained men within 60 to 90 days. A mission recommendation that additional demonstrators and installation engineers be trained was adopted immediately. Furthermore, on recommendation of the mission, the British Government is sending from 70 to 100 mine managers to the United States to gain experience in the use of American mining equipment under conditions similar to those at home. Some of the men already have arrived at the American mines.

The mission found a very complex labor situation, of long standing, in the British mines. However, there was found no antagonism on the part of labor to the installation of American mining machinery or to changing the mining system. Labor seems to realize fully that mechanization is the only way to achieve additional coal production during the present critical shortage, and that cheap coal is necessary to maintain the commercial position of the British coal industry after the war.

The mission has expressed its deep appreciation of the fine cooperation extended to them during their visit in Great Britain and of the unlimited efforts of the British officials concerned to make it possible for the mission to obtain all desired information without any restriction. The cooperation of all those concerned with the coal mission in the United Kingdom demonstrates the value of combined efforts in the solution of common problems. The planning undertaken by the Combined Production and Resources Board to stimulate the production of coal will be of undoubted benefit in alleviating the world coal shortage.

States, can halt its production decline and start its output on the upgrade is a quesion only the future can answer. The record to date, when contrasted with that in the United States, certainly leads to the conclusion that substantial improvement is possible, especially when British coal-mining practices, with due allowance for differences in natural conditions, are contrasted with those in effect here. The conclusion of the mission is that the British are making excellent use of U. S. machinery and technical assistance and that there is a good chance that they will attain the desired goals.

How has the British coal industry

fared since the war began for that country in 1939? Like the United States, it has been afflicted by absenteeism and has lost manpower, some of it because, as here, the importance of coal production was not realized until the damage had been done. From 781,700 in 1938, "average number of wage earners on the colliery books" dropped to 697,600 in 1941, bouncing back slightly to 709,300 in 1942 and then dropping again to 707,800 in 1943. Herculean efforts, including drafting men to the mines, are being counted upon to build up the number in 1944 and 1945.

In the United States, average number of men employed at mines operating, after a drop from 1938 to 1939, started rising in 1940 in the bituminous industry. This rise continued until 1943, when there was a sharp drop of 34,000 in a year to an estimated total of 428,000. Employment in 1944 has been estimated at 400,000. In anthracite, number of employees has declined steadily in the last six years.

### Tons per Man Down

In the realm of output per man-shift, declines have been registered in both Great Britain and the United States for approximately the same reasons, including the loss of younger men and the necessity of employing green and less efficient hands. In both countries, however, an increase is expected in 1945 if not in 1944.

It is the production record, however, that Great Britain and the United States show the greatest contrast. Since the start of the war for Great Britain, production has dropped steadily year by year from 268,357,000 net tons "raised and weighed" in 1939 to 227,342,000 tons raised and weighed in 1943. The decline continued into the first quarter of 1944, but the year as a whole is expected to show an increase.

United States production has steadily increased each year since 1940, when the country embarked on its defense program, and in 1942 and 1943 the bituminous industry broke all previous production records. Both anthracite and bituminous are up again this year, which means another record-breaking tonnage for the latter if the production pace keeps up.

A major factor in the ability of the U. S. coal industry to increase output in spite of decreased manpower and productivity lies in its producing capacity. In other words, U. S. mines have increased output largely by working more days and in that respect they have had an edge over British operations. For example, available data indicate that British mines hoisted approximately 263 days in 1939, against 183 days for anthracite and 178 days for bituminous in the United States. In 1943, a reasonable estimate for British operations would seem to be 280 to 290 days, against 270 for anthracite and about the same or slightly more for bituminous in this country. But, giving due effect to manpower and productivity losses, as well as other factors less susceptible of accurate measurement, it would seem that the British coal industry failed to make the most of the extra days available to it for production.

Output per man per year, in fact, was about the same in Great Britain in 1943 (321 net tons of coal raised) and in 1891 (some 323 tons). Only by the most strenuous efforts, after the war started, was it raised to 350 tons in 1939 and 347 tons in 1940, after which it slipped again, largely because the foundation was fundamentally unsound. In the United States, on the other hand, bituminous production per man per year has risen from 573 net tons in 1891 to 1,261 tons in 1942 and an estimated figure of 1,350 tons in 1943; anthracite, 369 tons in 1891 and 751 tons in 1943. Until recently, at least, the difference appears to lay in the tendency by British management to cling to traditional equipment and practices and by British miners to dodge their share of responsibility for promoting low-cost production, with the government, despite its expanding role in coal, doing little to change the picture for the better.

## SIX YEARS OF COAL MINING IN GREAT BRITAIN AND THE UNITED STATES

### EMPLOYMENT

| | Wage Earners, Great Britain | Men Employed, United States — Anthracite | Men Employed, United States — Bituminous |
|---|---|---|---|
| 1938 | 781,700 | 96,417 | 441,333 |
| 1939 | 766,300 | 93,138 | 421,788 |
| 1940 | 749,200 | 91,313 | 439,075 |
| 1941 | 697,600 | 88,054 | 456,981 |
| 1942 | 709,300 | 82,121 | 461,991 |
| 1943 | 707,800 | 79,153 | 428,000* |

### OUTPUT IN NET TONS

| | Great Britain | United States — Anthracite | United States — Bituminous |
|---|---|---|---|
| 1938 | 262,759,000 | 46,099,000 | 348,545,000 |
| 1939 | 268,357,000 | 51,487,000 | 394,855,000 |
| 1940 | 259,926,000 | 51,485,000 | 460,772,000 |
| 1941 | 238,956,000 | 56,368,000 | 514,149,000 |
| 1942 | 236,844,000 | 60,328,000 | 582,693,000 |
| 1943 | 227,342,000 | 60,644,000 | 589,000,000* |

### OUTPUT PER MAN-SHIFT IN NET TONS

| | Great Britain | United States — Anthracite | United States — Bituminous |
|---|---|---|---|
| 1938 | 1.30 | 2.79 | 4.89 |
| 1939 | 1.30 | 3.02 | 5.25 |
| 1940 | 1.26 | 3.02 | 5.19 |
| 1941 | 1.23 | 3.04 | 5.20 |
| 1942 | 1.20 | 2.95 | 5.12 |
| 1943 | 1.20 | 2.78 | 5.05* |

### OUTPUT PER MAN PER YEAR IN NET TONS

| | Great Britain | United States — Anthracite | United States — Bituminous |
|---|---|---|---|
| 1938 | 336 | 478 | 790 |
| 1939 | 350 | 553 | 936 |
| 1940 | 347 | 562 | 1,049 |
| 1941 | 343 | 617 | 1,125 |
| 1942 | 334 | 705 | 1,261 |
| 1943 | 321 | 751 | 1,350* |

* Estimated

Remedies being relied upon to turn the production curve up include more men (from the armed forces, volunteers, men choosing coal mining instead of military service and men directed into the mines instead of the forces); installation of mechanical-mining and other modern producing equipment (including loading and cutting machines, conveyors and shuttle cars), much of it supplied by the United States under Lend-Lease; introduction of U.S. mining methods, such as the room-and-pillar system; and increased stripping, also dependent in large measure on U.S. equipment and engineering advice.

## Little Power Loading

A quick glance at the figures seemingly would indicate that British mines are more highly mechanized than those in the United States. Actually, British "mechanization" is a very different thing. Some 54 percent of the British output was handled by conveyors in 1938 and by 1943 the percentage had risen to 66. But mechanical loading, or "power loading" in British parlance, had so far been little practiced in the Isles.

Total number of "power loaders in use" in 1943 was 110, and the Ministry of Fuel and Power, in its "Statistical Digest From 1938," issued in July, reported a total of 1,288,541 net tons "power loaded to conveyors." The major part of this tonnage was handled by loaders somewhat resembling shortwalls operating on semi-longwall faces and crowding or conveying the coal onto belts laid in front of the faces, these face belts in turn discharging to loading belts commonly termed "gate-end loaders." Except for the absence of the loading machine, substantially the same system is followed where hand loading is practiced with conveyor transportation.

U. S. equipment now being supplied and installed includes duckbills, loading machines and shuttle cars, in addition to conveyors and cutting equipment, to a value of over $5,500,000 when the present program is completed. While shipments to complete the program will be finished as soon as possible, movement of the remaining items has been held up temporarily until that now in Great Britain has been installed and is producing as contemplated. The rule is to apply this equipment in places where it will yield the greatest returns in actual tons and in increased output per man.

The first consignments of U. S. coal cutters and loaders began arriving in Great Britain early in 1944, although a few scattered machines had been purchased and installed earlier. In February, it was reported that operations had started or were about to start in 14 pits and a little later it was stated that some 50 seam projects were under review to receive U.S. equipment. The number of coal mines in Great Britain was 1,782 in 1943, according to official figures.

By the end of the first quarter of 1944, it was further reported that development work was in progress in a number of collieries and that some rooms had been driven, although no pillar work had yet been done. A still later report had it that there were three duckbill installations in three different seams, while 23 U. S. loading machines were in operation, grossing, however, only 10,100 net tons per week.

While initial results were disapointing, even to British coal men, reasons for the slow progress were inherent in complete changes in mining methods, lack of trained operators and unfamiliarity with maintenance requirements. A school for mechanics and electricians at Sheffield University was expected to start turning out mechanics and electricians before the end of the year and a mission recommendation that additional demonstrators and installation engineers be trained was adopted immediately. "Furthermore, on the recommendation of the mission, the British Government is sending 70 to 100 mine managers to the United States to gain experience in the use of American mining equipment under conditions similar to those at home."

## Machines Welcomed

Some responsibility for lack of results also could be laid to lack of faith in the new equipment and methods by British operating men, although the prevailing sentiment was expressed by William Reid, general works manager and director, Fife Coal Co., Ltd., Scotland, in *Mining and Metallurgy*, as follows:

"The British coal-mining engineer, given the opportunity to install American plant, is confident that he can give results for the war effort worthy of the sacrifice being made by coal producers in America in sparing it to him."

The need for coal also plunged Great Britain into a coal-mining method even more foreign to custom than use of U.S. mechanical-loading equipment and methods: to wit, stripping. While a few scattered projects had been operated from time to time in the past, stripping did not get under way until about March, 1942. Production in that year was 1,465,200 net tons, rising in 1943 to 4,957,900 tons.

Stripped equipment being used in Great Britain, much of it derived from the United States, comprises small shovels, draglines, scrapers and haulage units. Stripping is conducted under the control of the Ministry of Works. Sites are first prospected thoroughly and if found suitable usually are worked by taking off the top soil and stacking it, stripping and loading the coal, then backfilling and replacing the top soil to permit the use of the land for growing crops immediately.

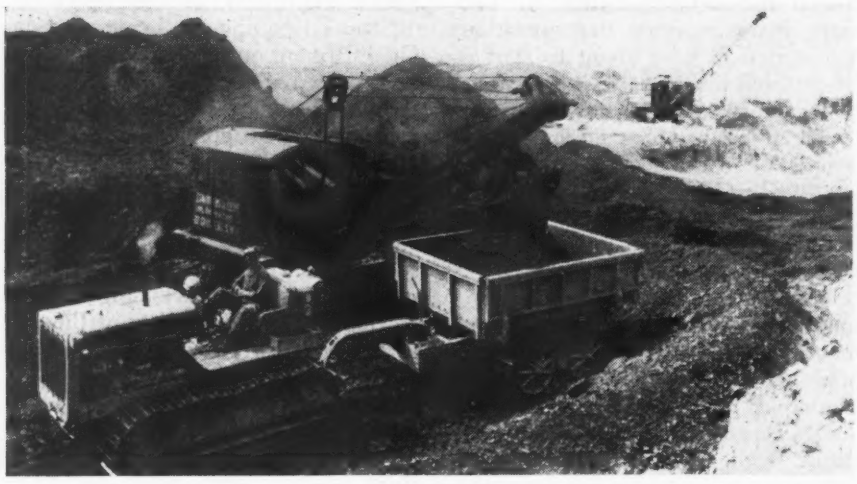
As of May, 1944, 128 strip sites had been worked and turned back, according to an official report, and some of them already were producing food again. At that time, also, some 93 pits were producing and 26 were scheduled for immediate operation, in addition to 120 more sites approved for work at a future date. At the end of 1943, equipment in service was reported to comprise 342 draglines, 255 shovels and skimmers, just under 400 tractors and scrapers and some 400 miscellaneous transport units.

## U. S. Supplies Strippers

Great Britain also has received and has or is putting into operation 250 shovels and draglines of 1½ cu.yd. or more and 100 tractors with scrapers and bulldozers which the United States undertook late last year to supply in 1944. This equipment was used equipment supplied by the construction industry and reconditioned for British stripping. With these units, plus those already in service and those Great Britain herself has been able to supply, current strip production is at the rate of 11,200,000 net tons annually and the mission is of the opinion that the rate could be 20,200,000 to 22,400,000 net tons annually. The British view, as reported by the mission, is that about 16,800,000 net tons is the best that can be expected from stripping in the coming coal year. "The total amount of coal that the mission thinks can be mined by this method is from 80,000,000 to 100,000,000 [gross] tons."

In the early stages, much of the British strip output was used without further preparation and access roads or tracks were often lacking. In general, attempts are made to have the strip coal used at nearby points. With improvements in shipping facilities and a comprehensive program for screening and other preparation, strip coal now moves readily into consuming channels.

To recapitulate, strip production has grown from practically nothing prior



**NEW TONNAGE BUILDER FOR BRITAIN—Stripping is expected to yield Great Britain some 16,000,000 extra tons in the coming coal year. Prior to 1942, production by this method was practically zero.**

to 1942 in Great Britain to an expected rate of 16,800,000 net tons annually in the coming coal year. "Full operation of all 'deep-mine' equipment provided for under the 1944 program, plus a similar program proposed for 1945," says the mission, "should help Britain to increase its underground coal production by approximately 12,000,000 [gross; 13,440,000 net] tons per year."

Why, aside from such apparent factors as declining manpower and the like, Great Britain's coal industry was left staggering by war demands is a question of not only immediate but long-time significance. It inevitably involves the political and social climate in the Isles and on how these political and social problems are solved depends in large measure the position of the British coal industry in the future. More efficient production, it is true, is one aspect of the solution, but the whole takes in the political and social aspects as well.

The picture in Great Britain is one of government control approximating complete nationalization. Books could be written about why this came about. One faction holds that it was largely the result of refusal by the British operators to meet labor half way. The consequent strife, this same group contends, forced government intervention, and continuation of the recalcitrant attitude of the operators necessitated more and more control by government.

Probably the attitude of the operators has been a factor in British developments, but it also is a fact that the miners and "liberal" elements in Great Britain have been highly vocal advocates of nationalization since World War I. Admitting that some of the steps taken by the government may have been forced upon it, the course of events leads to the conclusion that it has been more receptive than not to proposals for restricting the powers of management and transferring control of the industry into government hands.

One effect undoubtedly has been to deprive the industry of the necessary elasticity to meet the burden thrown upon it by the war. Uncertain of what the government would do next, inclined in consequence to contract rather than expand operations and hold to existing methods rather than modernize, and with less and less voice in the control of their properties and in relations with labor, the operators were in a bad way to cope with the emergency when it arose. In addition, World War II brought about increased strife and more agitation for stiffer and stiffer control, to which the government acceded. Yet, while accepting the increased authority, the British Government has shown a reluctance to take real action verging on fear. Even now, signs of a real policy are difficult to find. Regardless of where the greater measure of the blame lies, the results have proved that government orders and regulations are a poor substitute for efficient management-labor teamwork in production.

Whether the future will bring a workable solution to the problem of relations between management, labor and government still is a matter for speculation. Some hope might be inferred from the summary of the mission's report, which had this to say:

"The mission found a very complex labor situation, of long standing, in British mines. However, there was found no antagonism on the part of labor to the installation of American machinery or to changing the mining system. Labor seems to realize fully that mechanization is the only way to achieve additional coal production during the present critical shortage, and that cheap coal is necessary to maintain the commercial position of the British coal industry after the war."

British mining conditions are different and so is the political and social climate as compared with the United States. British seams are generally thinner, under deeper cover, subject to greater faulting and pitching and often afflicted with much poorer roof than those in the United States. The British public is much more tolerant of government intervention in the industry and much more inclined, whether correctly informed of the facts or not, to be sympathetic with agitation for additional government control.

But perhaps the events of World War II will lead to a better understanding of what operators, miners and government must do to insure efficient labor-management teamwork, although the solution may not be exactly along U.S. lines. Decision of the miners to merge their 22 separate district associations into a single national union is considered by many as one step in the right direction. In the field of production, the mission was of the opinion that some 20 percent of the present annual British output can be mechanized immediately with U.S.-type equipment, with a corresponding increase in productive efficiency and contribution to the war effort and the future of the industry.

## Future Offers Opportunity

The average British coal mine, however, tolerates equipment and practices in mining, preparation, transportation and other activities that no efficient U.S. operation would stand for for a minute, such as shoe-box cars, rope haulage and a high proportion of hand work where machinery could be applied to cut cost and increase productivity. Changing these is a long-time job and, in some cases, because of differences in natural conditions, they cannot be changed. But, from this side of the water, it appears that Great Britain nevertheless has an opportunity for a major increase in productive efficiency. While she probably cannot reach U.S. levels because of differences in conditions, it appears quite possible that she can raise output per man to at least half that in this country, meaning double or triple the rate now prevailing in the Isles.

Great Britain has made a start. By carrying through she will render maximum support to the war effort and assure a strong, healthy industry in the future.

# HARD SHEAVES

## Save Ropes and Prevent Steel Waste

By WILLIAM SIBLEY, M.E.

TODAY—and doubtless for some years to come—conservation of steel is a prime necessity. Take, for example, what might appear to be the simple matter of sheaves. Not especially expensive in themselves, sheaves can, if not of the proper material, prematurely ruin wire rope costing much more.

One of the results of using sheaves of too soft a material is that the wire rope leaves its imprint in the sheave groove. Such a condition results in excessive sheave wear and tends to shorten the life of the rope. Also, when a new rope is installed it is quite unlikely that it strands will fall in the old "tracks" or match the old corrugations. This leads to further wear of the sheave in addition to a severe filing action on the new rope. Under such a condition the new rope starts its service life under a handicap.

Some hold to the theory that soft sheaves will save rope by taking the abrasion themselves instead of abrading the rope. Experience does not bear this out. Hard sheaves generally maintain a smooth tread surface. Soft sheaves do not. Instead, they tend to get rough and act as a file against the crown wires of the rope.

### Barbing a Factor

The roughening of sheave treads is further heightened by the tendency of some ropes to "barb," which is simply projection of jagged, broken wire ends from the body of the rope. These wire ends dig into the sheave if it is soft. This trouble may be avoided by using preformed rope, since this rope does not tend to form jaggers. Instead, the broken crown wires lie flat, thereby retaining the smoothness of the rope's surface. More than this, preformed wire rope has less tendency to rotate in the grooves as it passes over the sheave, thus minimizing the rope's grinding action.

It is a simple matter to determine how hard the material of the sheave tread must be to withstand the pressure of the rope. In the usual case, where the rope at all times is in contact with half the periphery of the sheave, the formula employs the following factors:

$P$, maximum unit bearing pressure, in pounds per square inch, of the rope against the groove tread.

$L$, rope tension, in pounds.

$D$, diameter of the rope in inches.

$d$, tread diameter of the sheave in inches.

For 6x19 regular-lay wire rope, filler-wire construction, which is a common rope for industrial applications, the minimum recommended value of d/D is 26. Substituting this value in the formula we have:

$$P = \frac{L}{13D^2}$$

If the rope is of plow-steel grade, and a factor of safety of six is used, the value of $L/D^2$ becomes 13,300 for ¼-in. rope, 12,500 for ½-in. rope, and 12,000 for 1-in. rope. Taking a value of 12,500 as being fairly typical, and substituting this in the equation we have:

$P = 961$ lb. per square inch.

Consulting the table of safe unit bearing pressures, we find that this figure is far greater than the maximum bearing pressures recommended for gray cast iron, is somewhat near to that for cast steel and is much below the safe bearing pressure for manganese steel. Therefore, under the conditions given, which are fairly representative of what will be found in industry, the cast-iron sheave plainly is too soft, the cast-steel sheave generally will stand up satisfactorily under the rope pressure, and the manganese-steel sheave will stand bearing pressures that are several times higher.

If gray cast-iron sheaves are to give satisfactory service, the value of P must be considerably reduced by either increasing the size of the sheave or reducing the load on the rope.

Many different types of rope-operated equipment are being supplied today with sheaves made of heat-tested cast alloy steel containing manganese, molybdenum or other alloying elements. A hardness of around 350 Brinell is not uncommon with these alloy-steel sheaves, which stand up satisfactorily under almost all kinds of service. Where alloy-steel sheaves must be replaced, sheaves at least as hard and tough should be used.

### No More Harmful

The argument has been advanced that steel against steel should be avoided, and since the rope is steel the sheave, therefore, should be of some other kind of metal, such as cast iron or semi-steel. This argument is not supported either by theory or practice. There is no reason why steel against steel is more harmful than cast iron against steel.

It is important to remember that one can't save the rope by destroying the sheaves. Contrary to what some might expect, the use of harder metal to prolong sheave life actually results in increasing the life of the rope. It is seldom that a metal as soft as gray cast iron can be justified as sheave material. To get satisfactory performance from both sheaves and ropes, no metal softer than commercial cast steel should be used, and in many cases manganese-steel sheaves will save in rope and sheave replacement much more than their additional first cost.

### Safe Unit Bearing Pressures of Ropes on Various Materials in Sheaves
(Pounds per Square Inch)

| Material | Regular-Lay Ropes 6 x 19 | Regular-Lay Ropes 6 x 37 8 x 19 | Flattened-Strand Ropes |
|---|---|---|---|
| Gray cast iron | 500 | 600 | 800 |
| Carbon steel casting | 900 | 1075 | 1450 |
| Manganese steel | 250 | 3000 | .... |

**Note: For Lang-lay ropes, the values given for regular-lay ropes may be increased 15 percent.**

# CHECKING VENTILATION

## Increases Efficiency and Cuts Power Cost

Good Mine Ventilation a Job for the Engineer—Reducing Leakage, Eliminating Resistance, Cut Cost and Provide More Air—Accurate Readings Essential in Keeping Ventilation up to Par

By J. H. DICKERSON
Mining Engineer
Huntington, W. Va.

MINE VENTILATION to be economical must provide fresh air to workmen to promote their efficiency, health and safety by diluting and removing objectionable, poisonous and explosive gases from the mine. In admittedly gaseous mines sufficient air usually is supplied to reduce the percentage of inflammable gas in the return airways to less than 0.5 percent. This provides a considerable factor of safety and also allows time for the correction of a bad condition or the removal of workers before an explosive mixture is likely to occur in case the outside fan is stopped or the air in one section is short-circuited by the failure of a stopping, an open door, or other cause. The quantity of air is thus fixed by the expected volume of gas rather than number of men employed or other means, and is higher than for the so-called non-gaseous mines. As a consequence, workers in a gaseous mine usually get better air and ventilation is better supervised than in mines where the principal objective is supplying fresh air to workmen.

### Oxygen Deficiency Slows Work

In non-gaseous mines the supply of air sometimes is so low in working sections that there is not sufficient oxygen left to permit the men to work efficiently, or is too low to quickly remove powder smoke which contains dangerous gases and reduces visibility so accidents may occur. An unattended or defective door, which does not serve as intended, may cause miners nausea or headache, besides delaying the removal of powder smoke that interferes with operations.

While the quantity of air delivered to the face in a gaseous mine may be quite satisfactory, it frequently is obtained at an excessive cost. For this the mine foreman should not be held responsible. His duty should be limited to the distribution of air in the working sections, to emergency repairs in the main air-supply entries and changes in the plan of ventilation as directed by the management of the property. While it has been found that foremen frequently know more about ventilation than do the engineers, this condition largely results from the fact that our universities neglect this subject in the apparent belief that it is something that the engineer can learn after he leaves school. It also is due to the failure of operators to make engineers responsible for proper planning of ventilation. The engineer and mine foreman should work together for economical and efficient ventilation in all coal mines.

If, as stated, ventilation is not adequate, or its cost is excessive, it is a job for an engineer. If left entirely to the mine foreman, ventilation is likely to be by a continuous air current, or by long, unbalanced splits. Regardless of the cost, he complies with the law if he gets fresh air to the workers and removes dangerous gases. Changing the plan of ventilation may involve considerable costs for new mine openings, new fans, entries, overcasts, etc., which a foreman cannot undertake without authority, but may bring a greater return than any change in the method of operation (for suggestions see "Right Fan Location," November, 1942, Coal Age; "Split Air Currents," January and May, 1943; and "More Air With Less Power," September, 1942, and April, 1943).

Air leakage is one of the principal causes of excessive costs in mine ventilation. Masonry stoppings are advisable if they are to be used over a year, but they will not prevent leakage entirely even when new. It hardly is practicable to build them heavy enough

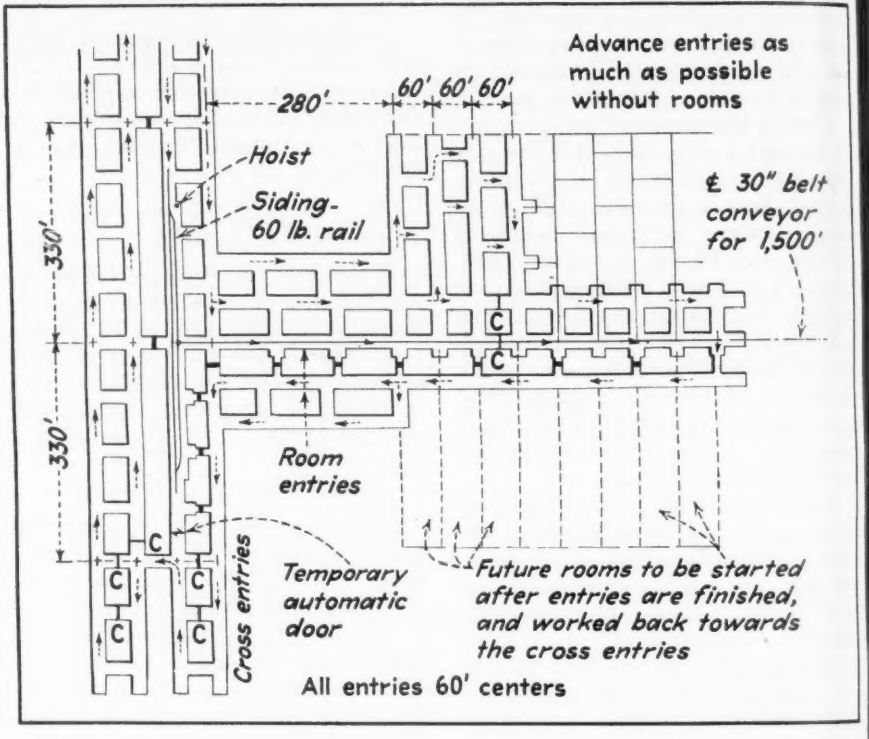



Fig. 1—One method of providing ample airways for ventilation in conveyor mining.

to withstand roof pressure, heaving bottom, etc., and air surveys should be made occasionally to check pressure and leakage, so that defective stoppings may be located and repaired. If there is more than 20 percent leakage between the fan and the working sections, it is very important that it should be reduced. If there is 50 percent leakage, the power loss in delivering the air reaching the working sections is about 78 percent of the fan power (see table for "Relation of Leakage to Power Cost," *Coal Age*, May, 1941).

The excess air between the fan and the working sections is of no value whatever. Besides the power loss, it absorbs moisture from the mine at certain periods when explosions are most likely to occur and at others it causes excessive humidity, which may reduce the efficiency of workmen. Furthermore, excessive air is likely to cause more roof falls at certain periods, and falls between the fan and the working sections cause higher resistance and more leakage. The matter of roof control is so important in some mines that the U. S. Bureau of Mines is studying air conditioning with the idea of controlling humidity and reducing slate falls.

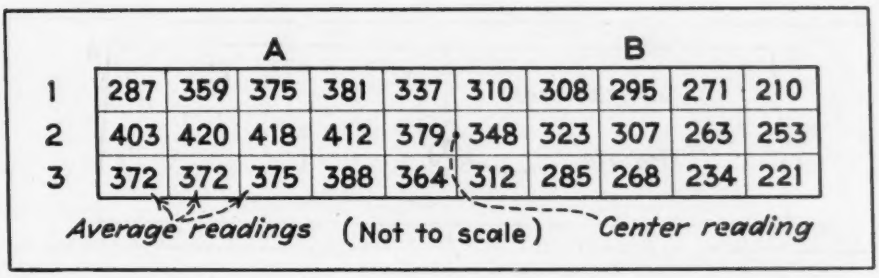



**Fig. 2—How velocity readings vary throughout a mine heading and thus require care to obtain a true average.**

| | | |
|---|---|---|
| **Average, Line 1** | **313,** | **indicating 18,780 c.f.m.** |
| **Average, Line 2** | **353,** | **indicating 21,180 c.f.m.** |
| **Average, Line 3** | **319,** | **indicating 19,140 c.f.m.** |
| **Average, Left Side A** | **376,** | **indicating 22,560 c.f.m.** |
| **Average, Right Side B** | **280,** | **indicating 16,800 c.f.m.** |
| **Center reading** | **384,** | **indicating 23,040 c.f.m.** |
| **Average, 30 readings** | **328,** | **indicating 19,680 c.f.m.** |

## Less Leakage—More Air

Where excessive resistance is involved, there are many things that may be done to reduce leakage and pressure power losses, thus permitting the fan to deliver more air to the working sections at a given fan pressure. Sharp turns where the air velocity is increased and then checked, or reduced areas where the velocity is greatly increased and then slowed up ahead, increase pressure requirements. It may not pay to remove large slate falls in main airways, but the ends should be sloped at top and bottom, and the more restricted sections enlarged so there will be no abrupt changes in velocity.

All changes of this kind will help to reduce the mine pressure and the fan power bills. Special attention should be given to overcasts on open splits to see that the airway is not too irregular or restricted in area. New intake openings are frequently of great value in reducing mine pressure and providing fresh air direct to working sections. In mines where it is impractical to hold several feet of top and the air velocity is rather high, it may pay to gob part of the falls in crosscuts without obstructing stoppings and haul the remainder outside to get a good permanent airway section and a lower velocity. In other cases it may be desirable to drive additional airways either to reduce air velocities or to shorten air travel. Entries should be driven as straight as possible with regular turns instead of sharp turns. At points where an airway is picked up from a crosscut the airway should be opened full width. Frequently a block of coal is left in the airway and may not be shown on the map. Entries blocked by falls are of no value as airways, so the condition in which they are maintained is more important than their number.

In room entries for conveyor mining it usually is advisable to have three or more entries (see *Coal Age*, March, 1943). Where the main entries are of considerable length, there should be two or more intake entries and at least two returns. This will permit an interval of 300 ft. or more between crosscuts requiring stoppings. Ahead of the last open crosscut between intake and return airways, the intakes will serve temporarily for intakes and returns, and the same will be true for the return airways. These points are brought out in Fig. 1. In the cross entries, the crosscuts requiring stoppings are driven on 330-ft. centers. They also are driven narrow to reduce the cost of constructing and maintaining stoppings and the probability of damage by roof pressure. By using fewer and smaller stoppings in this manner leakage will be less than for the normal layout. The crosscut should be driven narrow all the way between entries instead of a few feet each side of the stoppings, as the latter might result in considerable pillar leakage. In the triple entries the stoppings are shown on 120-ft. centers. This generally will be permitted, although the usual distance required between breakthroughs is 60 or 80 ft., because the center entry can be used as a return temporarily and the crosscuts will be driven entirely from the center to the side headings.

To know what work is or will be required of the ventilating system in a mine it is necessary to take accurate readings of the quantity of air delivered by the mine fan and the fan pressure and then estimate the effects of any changes to be made in the plan of ventilation, as well as future requirements. Readings of air quantities taken by mine foremen usually are from 10 to 30 percent too high. They are quick readings taken principally as a comparison from week to week and are not sufficiently accurate for planning ventilation.

## The Why of High Readings

The high readings taken by foremen are due to a variety of causes, such as holding the anemometer in the hand, taking only one reading in the center or some other high-velocity part of the airway, holding the instrument at an angle to the air flow, inaccurate instruments, failure to make corrections for velocities outside of the normal range of the instrument, etc. In a smooth steel pipe the center reading is about 20 percent higher than the average, but in a mine airway the highest velocity is not always in the center of the airway, due to deflections caused by curves, timber, rough sides, etc., and the ratio between the highest and the lowest velocity in a cross-section may be as much as three to one. Low velocities occur near the perimeter where the air is slowed down by the rubbing surface.

In the airway shown in Fig. 2 the readings were taken by an engineer for a fan manufacturer. It was blocked off by lines making uniform rectangles, and the average velocity was deter-

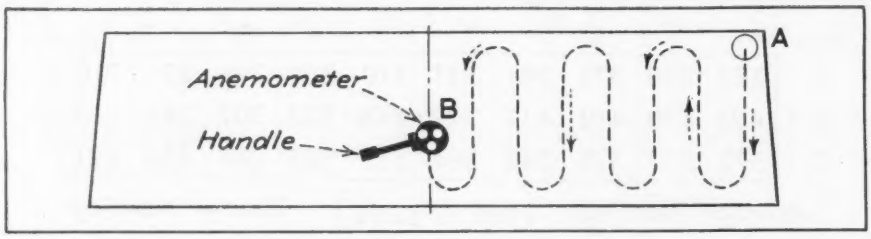



**Fig. 3—Showing diagrammatically how to take reasonably accurate air readings in a fan drift, using an anemometer on handle.**

mined in each with a tested instrument and a stop watch. The entry being 15x4 ft., the blocks were 16 in. high and 18 in. wide, which is too large for center readings. More than one-third of the area of 60 sq.ft. is within 8 in. of the perimeter and carries the lowest velocities, but this was taken care of by taking the average velocity in each block rather than a center reading. It will be noted that the highest average velocity is twice that of the lowest.

The average for the 30 readings is 328, indicating 19,680 c.f.m., which should be used as the correct quantity of air in the entry. The center reading was about 17 percent higher than the average. The foreman at this mine read 525, which would make 31,500 c.f.m.—just 60 percent too high. He may have held the anemometer so that there was a higher velocity through the instrument, or he may have held it at an angle to the current, too long for the period timed, caught a temporary high velocity, had a defective instrument or one which called for a correction of his readings.

It hardly is worth while to spend as much time and care in taking readings for ordinary purposes as is shown in Fig. 2. If a reading is desired in a fan drift, it is well to go in about 50 ft. for a small drift, or 100 ft. or more for a large one to avoid turbulence from the fan. The readings should be taken at a point where the sides are straight and the bottom has a uniform slope, without falls or obstructions nearby. The anemometers are made to be screwed into a handle which should be at least 30 in. long. This will keep the face of the instrument in line parallel to the stick, so the operator can keep it facing the air current. It is well to have a square hand hold on the end of the stick opposite the instrument so the operator will not tend to turn the handle and have the air enter the instrument at an angle.

To start, the operator should stand facing the air current holding the handle of the stick with the anemometer at arm's length. Then with the anemometer at Point A in Fig. 3 and keeping the instrument at arm's length, it is started and allowed to run continuously for about three minutes while it is being moved slowly and as uniformly as possble up and down, as indicated by the dotted lines, from *A* to *B* for one side of the entry. This operation should be repeated for the opposite side of the entry. The readings for each side should be divided by the time in minutes consumed in taking the readings and corrections made for the velocity if necessary, as shown by the correction table for the instrument used. The approximate volume of air passing in the entry will be the average velocity in feet per minute, or the mean for the two sides, times the area of the section.

For approximate pressure readings in a fan drift an aneroid barometer may be used if an accurate instrument reading to 2 ft. is available. In the article on "Air Surveys," in *Coal Age*, April, 1943, Table I gives constants for converting differences in static pressure to inches of water gage. This is based on barometric readings in inches corresponding to differences of elevation in feet at different levels. As the specific gravity of the air varies with temperature and atmospheric conditions, a true constant cannot be obtained, and those given generally will make the water-gage figures a little too high except in cold weather. However, it is better to have the figure a little high in furnishing data for a new fan.

It might be well to note temperature and barometer in inches at time of taking the readings for static pressure. In using the constants it is necessary to have the approximate elevation above sea level. If the point in the airway where the air volume was taken is elevation 1,250 ft., set the instrument for that elevation and then read it at another point on the same level outside. The difference between the readings inside and outside the mine multiplied by 0.015 for this elevation will represent the water gage in inches. Thus, 96 ft. would indicate a static pressure of 1.44 in. water gage.

If there is considerable velocity the velocity pressure should be considered. It may be compared to the flow of water in a stream. Where the current is rapid the velocity pressure is high and the static pressure is dropping more rapidly than in sections where the flow is slow. The velocity pressure may be a little higher than figured by using average velocity, but for 1,000 f.p.m., average velocity is used and the velocity pressure is 0.06 in. water gage. The total pressure for a blowing fan would be 1.5 in. w.g.

A more accurate method of obtaining static pressure is to put a pipe through the first crosscut stopping and connect it to a water gage. If this is not possible, an airtight pipe or tube may be extended from a point in the crosscut where the air is calm to a point outside the fan where the water gage is attached. If the air pressure must be taken from a point in the main air duct a pitot tube may be used. A satisfactory substitute for velocity pressure would be a 36-in. length of ¼-in. gas pipe with one end closed and rounded off in bullet shape, and the other end connected to a pipe or tube to the outside. About 6 in. from the rounded end of the pipe, make a ring of short slots about ⅛ in. in width. The rounded end of the pipe should be lined up to face the air current.

## Taking Shaft Readings

The same plan may be followed at the top of a shaft. The section of pipe with the closed bullet-shaped end may be lowered down the shaft with its connections to a point a little below the throat of the shaft. If it is convenient to get to a point below the throat of the shaft, a connection may be made from the inside to a water gage on the outside, but if it extends into the air current the reading may be affected more than the amount of the velocity pressure which would be added to the static pressure if there were connections made to take total pressure.

Having read the volume and total pressure, horsepower for moving the air may be figured. If the quantity is 50,000 c.f.m. at a total pressure of 1.5 in. water gage, it will require 11.8 air horsepower:

$$\frac{50{,}000 \times 1.5 \times 5.2}{33{,}000} = 11.8$$

Of course, the motor will be larger, as the fan may be only 25 percent efficient and at the most about 85 percent. If the fan motor-power consumption is checked for an hour, converting killowatts to horsepower, there will be further losses shown for motor inefficiency, belt transmission losses, etc., but if air volume and pressure readings are approximately correct the operator will have a fair idea of the over-all efficiency of the fan and drive.

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# Roof Fracture Regulated by Mine Methods

## *British Mine Also Finds Undercuts Make Projecting Coal Brows, Overcuts Make Projecting Toes, and Overcuts With Undercuts Make Coal Faces Plumb*

METHODS of working may be chosen that will change the direction of roof and coal crevices, so that they will be sloped, or haded, either inby or outby in relation to the coal face: that is, either "forward" (extending over the unmined coal) or "backward" (extending over the area where the coal already has been excavated). At least, this has been established for the Lount seam at the Desmond Colliery, in Leicestershire, England, as described in an article read by A. D. Butterley before the Midland Counties Institution of Engineers.

It must be remembered, however, that at his operation the coal is mined by longwall faces, 450 ft. wide, and conditions in our room-and-pillar or narrower longwall mines may be so different as to cause a different pattern of fracture. However, there must be some analogy between the actions, even under the different conditions usually obtaining in this country.

### Must Leave Coal in Roof

In the Leicestershire coal field most of the beds cannot be worked without leaving part of the coal seam to support the lower part of the roof, which is friable, consisting of impure fireclays and soft carbonaceous shales, in which, however, concretions of ironstone are embedded. Both the soft shales and the strata immediately adjacent to them are often much "slicken-sided." The Lount seam is a semi-lignite coal, tough when in place but fairly friable after it is mined and still more so after it has been dropped into mine cars. Efforts have been made to avoid leaving the roof coal in place, but in nearly all cases only with disaster both as to safety and production, possibly because the shale weathers in a few hours and disintegrates and falls between roof supports, no matter of what character they may be. The seam is about 600 ft. below the surface and dips from 5.5 to 6.7 percent in the direction of the advance of the face.

When the only cut made in the coal face was located at the floor (Fig. 1), the coal and roof broke so as to form fractures which haded backward toward the excavated area. For this reason, a marked brow occurred at the face which, for safety, had to be held in place, not only with a block at the edge of the kerf but also with a firmly based prop set at an angle to the face so as to form a brace, thus preventing the coal from rolling toward the gob. With this system of working, the roof settlement was so great that another method of working was tried.

When the kerf was cut above the portion of coal to be recovered (Fig. 2), the hading was in the opposite direction, the fracture leaning inby at the top and thus extending forward over the unmined coal. Unexpectedly, this method of operation proved very satisfactory. The small portion of coal indicated in Fig. 2 by cross-hatching, however, had to be wedged or blown loose so as to provide space for passage of the cutting machine.

When kerfs were cut above as well as below the part of the seam to be removed (Fig. 3), no breaks were visible in the roof or in such coal as was left for roof support. In some cases, however, the coal

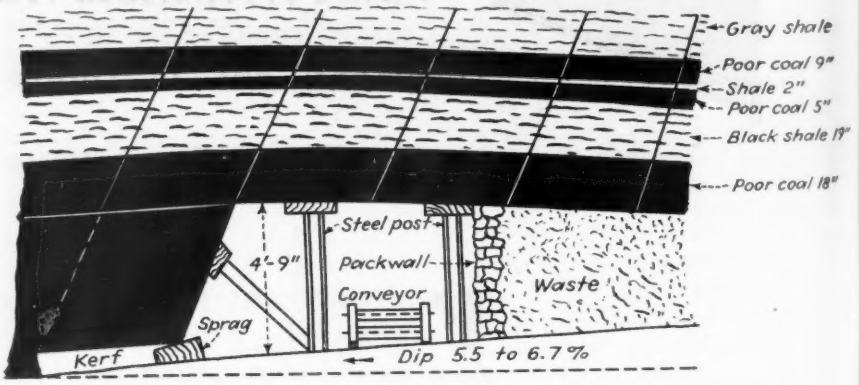



**Fig. 1—With undercutting, crevices lean over toward the gob, and blocks of coal have to be kept from tumbling from face.**

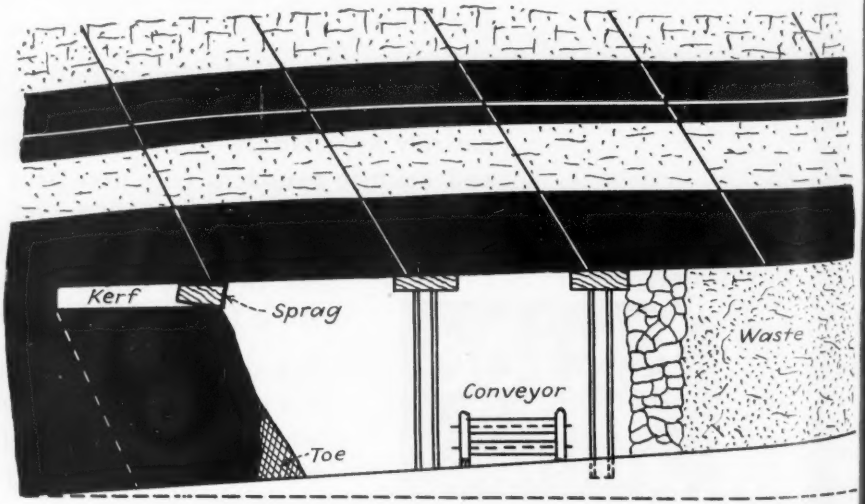
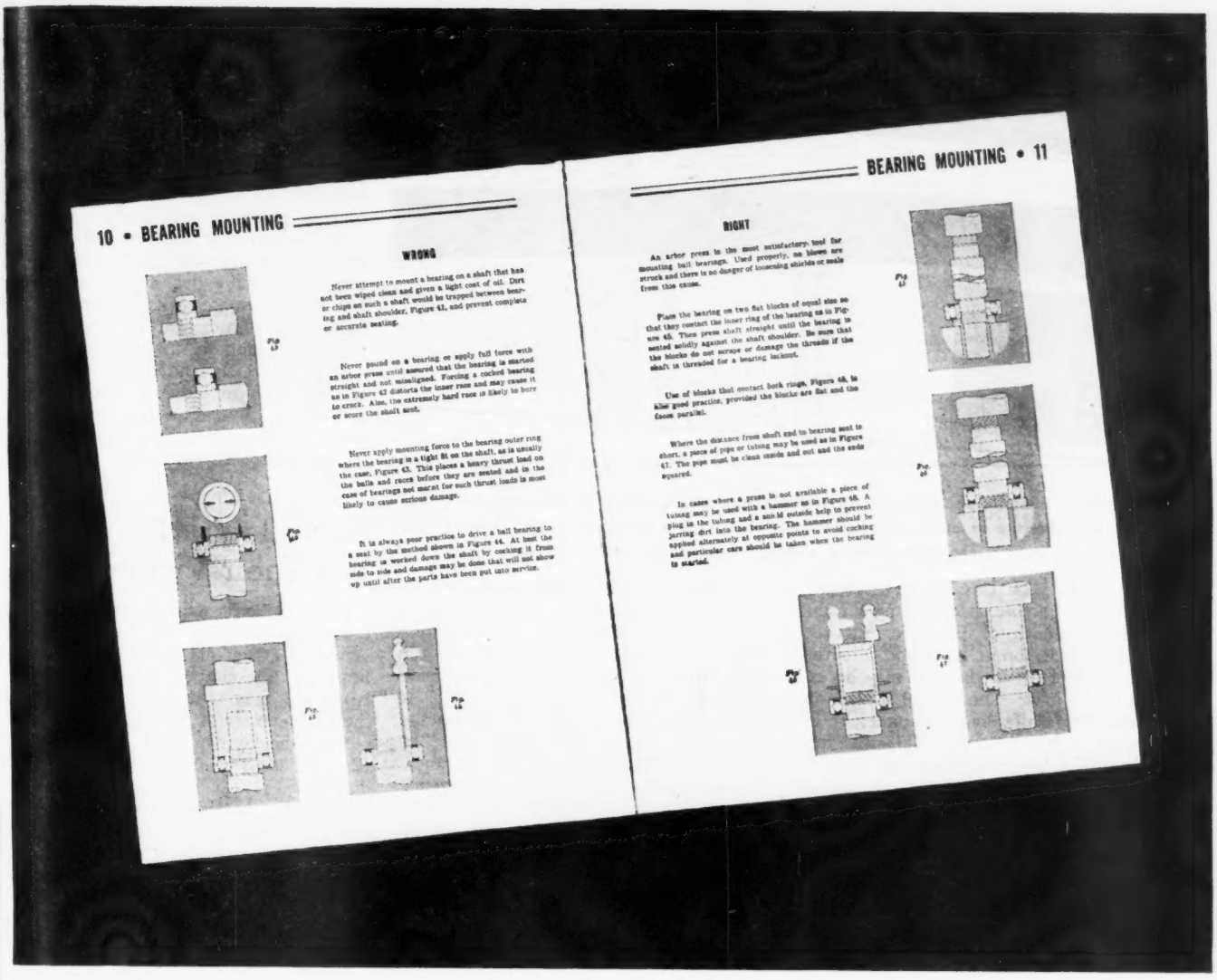



**Fig. 2—With overcutting, crevices lean over toward unmined coal ahead of operations, and blocks of coal remain in place without posting.**

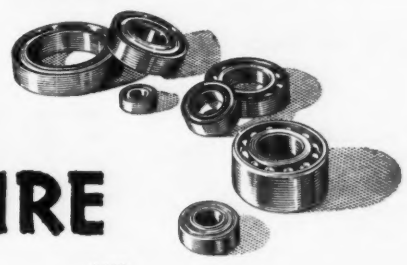

10 • BEARING MOUNTING
WRONG
Never attempt to mount a bearing on a shaft that has not been wiped clean and given a light coat of oil. Dirt or chips on such a shaft would be trapped between bearing and shaft shoulder, Figure 41, and prevent complete or accurate seating.
Never pound on a bearing or apply full force with an arbor press until assured that the bearing is started straight and not misaligned. Forcing a cocked bearing as in Figure 42 distorts the inner race and may cause it to crack. Also, the extremely hard race is likely to burr or score the shaft seat.
Never apply mounting force to the bearing outer ring where the bearing is a tight fit on the shaft, as is usually the case, Figure 43. This places a heavy thrust load on the balls and races before they are seated and in the case of bearings not meant for such thrust loads is most likely to cause serious damage.
It is always poor practice to drive a ball bearing to a seat by the method shown in Figure 44. At best the bearing is worked down the shaft by cocking it from side to side and damage may be done that will not show up until after the parts have been put into service.
BEARING MOUNTING • 11
RIGHT
An arbor press is the most satisfactory tool for mounting ball bearings. Used properly, no blows are struck and there is no danger of loosening shields or seals from this cause.
Place the bearing on two flat blocks of equal size so that they contact the inner ring of the bearing as in Figure 45. Then press shaft straight until the bearing is seated solidly against the shaft shoulder. Be sure that the blocks do not scrape or damage the threads if the shaft is threaded for a bearing locknut.
Use of blocks that contact both rings, Figure 46, is also good practice, provided the blocks are flat and the faces parallel.
Where the distance from shaft end to bearing seat is short, a piece of pipe or tubing may be used as in Figure 47. The pipe must be clean inside and out and the ends squared.
In cases where a press is not available a piece of tubing may be used with a hammer as in Figure 48. A plug in the tubing and a snug fit outside help to prevent jarring dirt into the bearing. The hammer should be applied alternately at opposite points to avoid cocking and particular care should be taken when the bearing is started.

# Correct mounting, as important as good bearings

• The small difference between the right and wrong ways of mounting ball bearings is often the difference between success or failure of their performance on a mission.

Those who bear the heavy responsibility for correct bearing servicing or installation should welcome the help that awaits them in our new booklet "Service Procedure For Ball Bearings." Never, we are told, has this subject been presented so clearly. The graphic pictures require a minimum of words to explain. In fact, you can almost get part of the story in the greatly reduced sample pages above.

We call this booklet "SP" for short. Any reasonable quantity will be sent you promptly on request — free as a contribution to the war effort. But, because paper is precious, order only what you actually need.



*Nothing Rolls Like a Ball*

**NEW DEPARTURE**

**BALL BEARINGS**

3269

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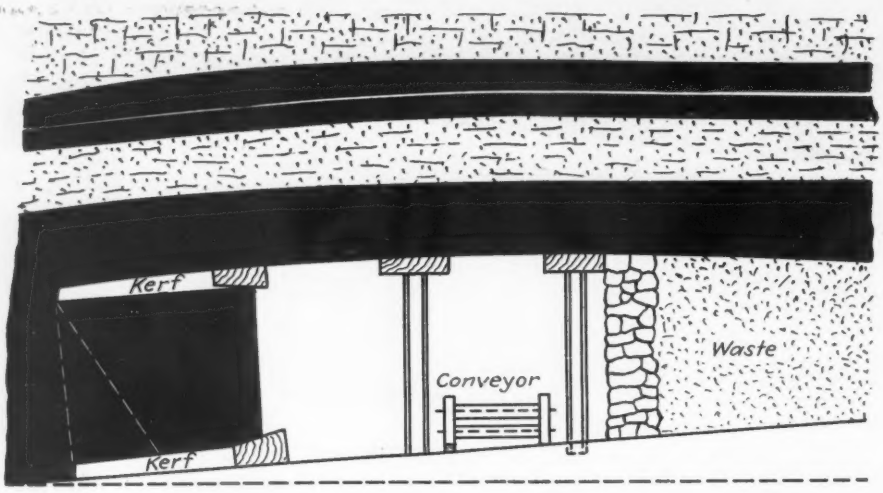


**Fig. 3—With overcutting followed by undercutting, no crevices in roof can be noted, but the coal breaks at cleat and sometimes also with a forward hading break: less explosive then is needed to dislodge coal.**

to be removed by this duplicate kerfing developed a fracture, hading inby for the full 450-ft. width of the face, but the crevice did not appear to extend into the roof. Its presence in the coal may be explained as follows: The top cut is made in the afternoon shift, and the undercut in the night shift following. When the top cut is made, the weight on the coal is transferred to the back of the cut, and a slight lift in the floor causes a break to develop that leans inby. When later the coal is cut near the floor, the coal by its own weight breaks vertically at the back of the cut. An eight-week period showed the results recorded in the table.

With the last of the three methods (1) coal breaks vertically back of cut; roof is not fractured; no overhanging brows are formed; face conditions are improved; (2) coal breaks readily to loading size, reducing size of shots; (3) depth of cut is increased; six cuts advance the face 30 ft. when a 4½-ft. cutter-bar is used; (4) labor of extra cutting is more than compensated by other savings and by extra tonnage for same length of face; (5) cuttermen "load" most of the coal cuttings, which accordingly are not lost in the gob; (6) more large coal is obtained; (7) "fillers" (hand loaders) do better work and produce more coal; (8) method probably well suited to mechanical loading.

In discussion J. J. Torrance, Coalville, emphasized that, with overcutting, the "fulcrum"—or should we say "pivot?"—round which the moments of the forces act is situated at the back of the cut in the top of the seam and when the floor is as soft as the roof, the weight acting through the packs exerts pressure on the floor, forcing it up and thereby inducing "forward" hading breaks in the coal. At the same time the weight acts also on the floor of the seam in front of the cut. "In my own experience," added Mr. Torrance, "I was able to correlate the convergence when undercutting with an acute angle and when overcutting with an obtuse angle."

Using the expression "convergence angle" in its most obvious sense, that angle is, and must be, acute, but Mr. Torrance apparently finds himself in entire agreement with Mr. Butterley and probably refers in his use of convergence angle to the angle between the under surface of the roof and the direction of its crevices as viewed at the working face.

Perhaps, convergence has too often been regarded as invariably the approach of the roof to the floor, whereas in many cases it may be more markedly the approach of the floor to the roof, and everywhere, except back in the coal face, rather a heave than a subsidence, with the maximum heave outby the face. Thus, with overcutting, the crack tends to start outby the back of the cut.

**RESULTS OBTAINED**

| | Over-cuts Only | With Both Cuts |
|---|---|---|
| Average output per shift, short tons | 324.8 | 395.4 |
| Men employed in section | 80 | 84 |
| Output per manshift to cage | 4.05 | 4.71 |
| Explosive cost per short ton, cents | 8.18 | 2.01 |
| Number of shots in coal | 180 | 30 |
| Number of shots per short ton | 0.554 | 0.0759 |

Increase in tonnage per loader with same yardage, excluding holings, was 6.3 percent.

## Explosive Gases Make Methane Touchy

METHANE, despite the damage it has wrought, is slow to act and also needs a high temperature to cause it to inflame and explode. Unfortunately, conditions often are such that methane nevertheless is readily ignited. Traces of nitrous gases, however, lower the ignition temperature by about 150 deg. C., or 302 deg. F., says the *Colliery Guardian*. Whether it also speeds ignition is not stated. This is important, for some high-temperature sparks and flames are quite transient and may fail to ignite methane for this reason.

Ammonium nitrate is the major constituent of most permissible explosives and, if the explosive burns or is otherwise heated, the nitrous gases emitted may lower the temperature at which the methane will burn and explode. Also, if particles of explosive are not detonated, they may burn in the flame and liberate nitrous gases. Experiments have shown that particles of undetonated explosive and particles of ammonium nitrate will do just that. A mixture of firedamp and air puffed into a heated vertical tube ignited at 700 deg. C., or 1292 deg. F. When a little ammonium nitrate dust accompanied the firedamp, 430 deg. C., or 806 deg. F., sufficed for ignition. In fact, an explosive was found which ignited the firedamp at 370 deg. C., or 698 deg. F. The imperfect detonation of a cartridge of explosive, therefore, may be an important factor in the ignition of firedamp.

## How Electric Shocks Kill Their Victim

Electric shocks suffocate their victim by causing an irregular, off-and-on spasm, a "clonic" spasm or "fibrillation" of the heart that prevents the blood from circulating and carrying its life-giving oxygen to the various parts of the body.

Such shocks may affect (1) the heart, (2) the nerve centers controlling respiration and (3) the muscles. The impure blood from the veins passes to the right auricle chamber of the heart and is pumped by the ventricle chamber of that organ to the lungs, where, purified, it travels back to the heart to be recirculated. This good blood is received by the left auricle chamber of the heart, which, actuated by the muscles, normally contracts and expands rhythmically in what is known as "heart beats." When the auricle contracts, it forces the blood into the ventricle chamber and this in turn by its contraction and expansion pumps the blood into the arteries.

Under an electric shock, these ventricle muscles, like those in other parts of the body, are subjected to a spasm and they "fibrillate"—that is, beat (contract and expand) rapidly and irregularly—so that the blood on which the body depends for its oxygen no longer courses through the system, and thus the individual smothers or asphyxiates. This quivering does not injure the heart, but the few minutes during which the body gets little or no oxygen are sufficient to cause suffocation (asphyxia), and the victim will die. He can live a long time without food, less time without water and almost no time at all without air.

Probably this is why ordinary resuscitation methods—the Schaefer or Sylvester—promptly administered are helpful in electric shock cases. They enforce a regular rhythm on the heart muscles that reestablish the blood circulation.

Other muscles than those of the heart may be affected; some may cause falls; others may make the individual grasp the offending wire by which the lethal current is conveyed, thus creating a tonic spasm as in tetanus, a continued effect, so that exhaustion is added to asphyxiation.

**WHEAT**

***The Approved Cap Lamp***

# A REPORT ON 30 YEARS OF SERVICE

## to the MINING INDUSTRY

YOU want to know about two things when you buy approved electric cap lamps:

1) The standing of the maker
2) Their performance in service

The Koehler Manufacturing Company has specialized since 1919 in engineering electric mine lighting equipment. The technical and manufacturing skill of the entire organization has incorporated latest improvements into the Wheat Approved Electric Cap Lamp. For over a quarter of a century one of New England's strong and stable manufacturers —where superior craftsmanship is almost a religion—the Koehler Manufacturing Company offers mine operators a record of service which sets the pattern to be expected for years to come.

These two facts are worthy of consideration as EXTRA VALUES when you are working out new mine lighting requirements.

The outstanding features and performance of the Wheat Approved Electric Cap Lamp did not just happen. Increase in sales each year testifies to its wide acceptance. The number of lamps in use has more than doubled during the past five years—proof of confidence in its quality—the service of the maker, and its strong financial standing.

Let us show you how solid engineering experience and the stability of continuous, responsible management and ownership can help YOU.—Consult WHEAT LAMP SALES INC., 1501 Kanawha Valley Bldg., Charleston, West Virginia, before making any change.

# KOEHLER MFG. CO.

**MARLBORO, MASS.**

## SPECIALISTS IN MINE LIGHTING FOR 30 YEARS

# STATE-BOARD QUESTIONS

## Mine Examiners, Illinois

Q.—An aircourse is 5 ft. high and 7 ft. wide. An anemometer held near the roof of the aircourse showed the air to be traveling through it at a velocity of 900 ft. a minute. When the anemometer is held near the center of the aircourse the velocity is found to be 1,000 ft. per minute while, near the sides and at the bottom, the reading is only 850 ft. a minute. What is the estimated quantity of air traveling through the airway?

A.—No exact or standard rule for determining the average velocity of the air in an airway has been formulated, but at best the reading of an anemometer is only an approximate indication of the velocity of the passing air. In every case the observer must use his judgment. It is important to choose a good method and to adhere to it and to measure the air at exactly the same station every time except when determining the flow at the last crosscut of a heading, the location of which naturally varies as the heading advances. In this way one is able to compare values between measurements and have all of them equally correct or equally in error; then differences between readings at different locations or times will have some meaning, provided the anemometer is in perfect adjustment.

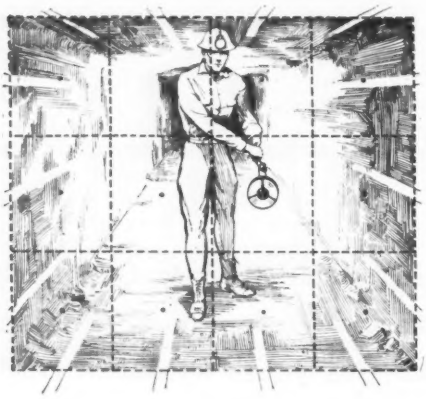

**Fig. 1—How to measure velocity with an anemometer.**

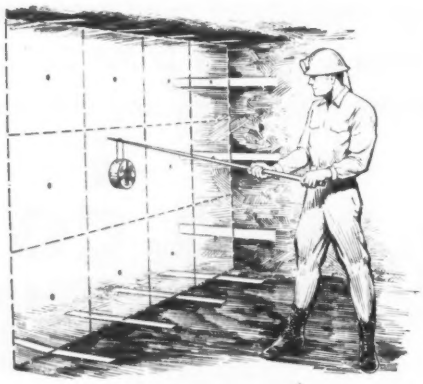

**Fig. 2—Division of airway into twelve zones.**

A good plan is to suspend the anemometer from a hook at the end of a 5- or 6-ft. stick and stand in the middle of the airway facing the current (Fig. 1). Hold the anemometer successively in twelve zones of the airway, as in Fig. 2, these zones being of about equal size and symmetrically distributed over the cross-section. Care should be taken to hold the anemometer as nearly as possible at right angles to the cross-section and so that the instrument will be facing the air current squarely.

The anemometer can be held for 10 seconds in each zone, but it must not be placed at any time nearer than 8 to 12 in. from any bounding surface because at that surface the velocity is so slow as to be no indication of the speed of the air even a few inches away. You will have $10 \times 12$ seconds $= 2$ minutes, so divide the result by 2 and you will have the correct value for one minute.

### Stand Back of Meter

No allowance need be made for the space taken by the observer's body because he is not at the cross-section being measured but several feet from it and no disturbance will be made because the observer has arranged to split the current with his body only *after* it has passed the anemometer. The current beyond an obstruction is seriously disturbed for a long way and travels in series of whorls or tornado-like swirls.

The air in Fig. 3 is seen from above approaching a prop on the left. It does not seem to note the presence of the prop until it reaches it, but, having been rudely displaced by it, it forms a series of miniature tornadoes and does not resume streamline flow for a long distance. An obstruction causes turbulence where the air strikes it only when it is wide like a wall, rib or working face. The anemometer itself does not disturb the air because its vanes, revolving with almost air speed, let the air pass through with minimum resistance.

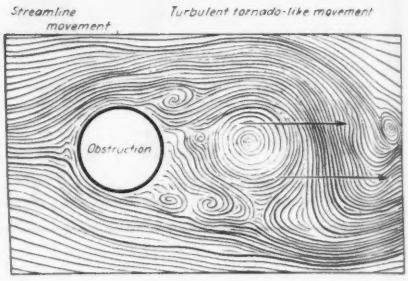


**Fig. 3—Note how orderly the air is in front of an obstruction (whether from the presence of a man or a prop) and how turbulent behind it. Drawn from photograph.**

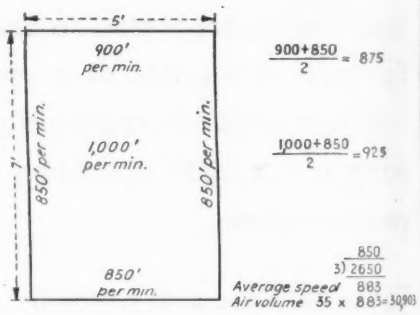


**Fig. 4—Showing calculation of volume of air current in question.**

It is a good plan at permanent stations to mark roof and sides plainly with lime or white paint 6 ft. long to show where the station is and where the lines of the zones strike roof and sides respectively. It aids in the approximate and rapid placing of the anemometer in the center points of the several zones and will guide the State inspector in taking his readings. The size of the heading should be standard, with no posts or other obstructions and with no safety hole or crosscut for 20 ft. outby the station.

Apparently, in the question, the velocity near the roof would vary from 900 ft. per minute to 850 or even less in the remote corners. An average, therefore, would be about 875 ft. per minute (see Fig. 4). The velocity along a horizontal line midway between floor and roof would be $(1000 + 850) \div 2 = 925$ ft. per minute, and at the floor 850 ft. per minute. Taking $875 + 925 + 850$ and dividing by 3, the average speed would be 883, or 0.883 times the velocity at the center, which seems likely to be excessive in this instance, though some multiply the velocity at the center by 0.9. If the average velocity is 883 ft. per minute, the quantity of air passing is

Actual photo of a Gulf Service Engineer consulting with mine Foreman on loading machine lubrication.

# One way to increase tonnage:

## *reduce down time for machines and equipment*

*———It pays to keep a Gulf Lubrication Service Engineer "in the picture"*

ONE ANSWER to the problem of getting maximum tonnage from your equipment is to make sure that a minimum of productive time and effort is lost due to shutdowns and below-par performance caused by excessive wear.

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GULF INDUSTRIAL LUBRICATION

***GULF OIL CORPORATION · GULF REFINING COMPANY***

***Gulf Building, Pittsburgh 30, Pa.***

883 × 5 × 7 = 30,905 cu.ft. or, say 31,000 cu.ft. per minute.

Q.—An airway 12.9 ft. wide and 8.9 ft. high is passing 50,000 cu.ft. of air per minute; what is the velocity of the air current?

A.—The area of the cross-section of the airway is 12.9 x 8.9 sq.ft. = 114.81 sq.ft. Therefore, for every foot of travel there are 114.81 cu.ft. of air. Thus, the problem is to find how many volumes of 114.81 cu.ft. there are in 50,000 cu.ft.; that is, how often 114.81 will go into 50,000. 50,000 ÷ 114.81 = 435.5. So the speed will be 435.5 ft. per minute.

# Coal Age Quiz

Q.—What is the most dangerous job in the mines?

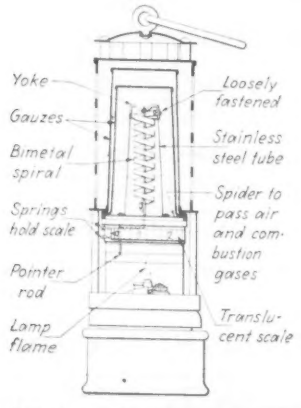
A.—Most people would say "mining coal" and point to the number of men killed and injured by falls of rock and coal, but in any mine most of the men are mining coal, so the fatalities and injuries from falls of rock and coal are spread over a large number of men. Next to mine bossing the most hazardous job is hauling coal because, with the fewer fatalities, there are still fewer men employed, and in consequence more men are killed and injured in proportion to the number of men thus engaged.

### Always Ready to Burn

Q.—What is the lowest percentage of methane at which that gas will burn in air.

A.—Probably methane in any percentage, no matter how low, will burn in air provided some combustible is burning which will supply the necessary heat and the methane can approach, and take part in, that combustion. It is surmised that the methane in the air at any and every concentration, large or small, enters into the combustion of the oil in the wick of a safety lamp or of any mine lamp that is burning and adds the heat of its combustion to that of the oil and wick.

When more than 1 percent of methane is present, the blue flame with which methane burns can be seen above the yellowish flame of the oil, forming what is known as the "cap on the flame of the lamp," but such a cap exists doubtless at a much lower percentage than 1 percent, though it cannot then usually be satisfactorily distinguished by the unaided eye. The effect of its combustion can be seen, however, by the glowing platinum wire ladders of the Beard-Mackey lamp and in the action of the turning spiral (see sketch) devised by the U. S. Bureau of Mines for detecting lower percentages of methane than 1 percent.




**Spiral, made of two metals back to back, turns where heat of lamp increases.**

Ability of methane to support its combustion in air without the continued presence of an exterior heat source begins with a content of 5 percent. This is known as the lower limit of self-propagation of flame. As self-propagation results in an explosion, it is known also as the lower explosive limit. At 5 percent, the explosion is very mild, though it may and probably will extend to a point where the percentage of methane is higher or coal dust is present, in either of which cases the results are disastrous.

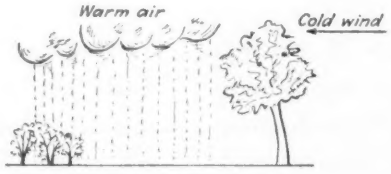
Methane may be able to burn at very low percentage on the surface of a heated solid by what is known as surface combustion, much as manufactured gas burns on an asbestos gas log without combustion of the log.

Q.—Under what conditions is artificial respiration required?

A.—Where the victim has been subjected to electric shock, gas poisoning, drowning or suffocation from any cause.

Q.—How can water dry the air entering a mine?

A.—Water can't dry air, but the air, if it is sprayed with cold water, will become cool and then cannot hold as much water as it does when warm. So it gives up some of the water, keeping only as much as it can carry when cooled to the temperature of the spray water. Water cools air just as rocks, metals and air will cool it if they are cooler than the warm air, and the air then does the rest (see sketch).




**Cold wind meets warm air, cools it and the air now cooled forms a cloud and, not being able to carry so much water, drops its excess as rain.**

Q.—Why should the full ventilating current of the split be used when fighting a mine fire by direct methods?

A.—(1) So that the fighters can get close to the fire, for the cool and fresh air helps them to face the flames. Half-baked and half-suffocated men cannot fight fire effectively.

(2) Because to bypass the air through a nearby crosscut may cause an explosion of the partly burned gases from the fire.

(3) Because if a fall should occur from the fire, if there is not a sufficient volume of air, the flames may be driven back on the men.

(4) Because the men should be enabled to go close to the fire so as to see where the combustion is most active and thus be able to place the water where it will do most good.

Q.—Is the ability to reverse a mine fan helpful in case of a mine fire in the intake?

A.—When a fire occurs in an intake shaft, slope or drift or close to an intake portal, the flames and incombustible gases will be carried in a few minutes to all parts of the mine; therefore it is argued that provision should be made for reversal, and the fan should be reversed as soon as such a fire occurs.

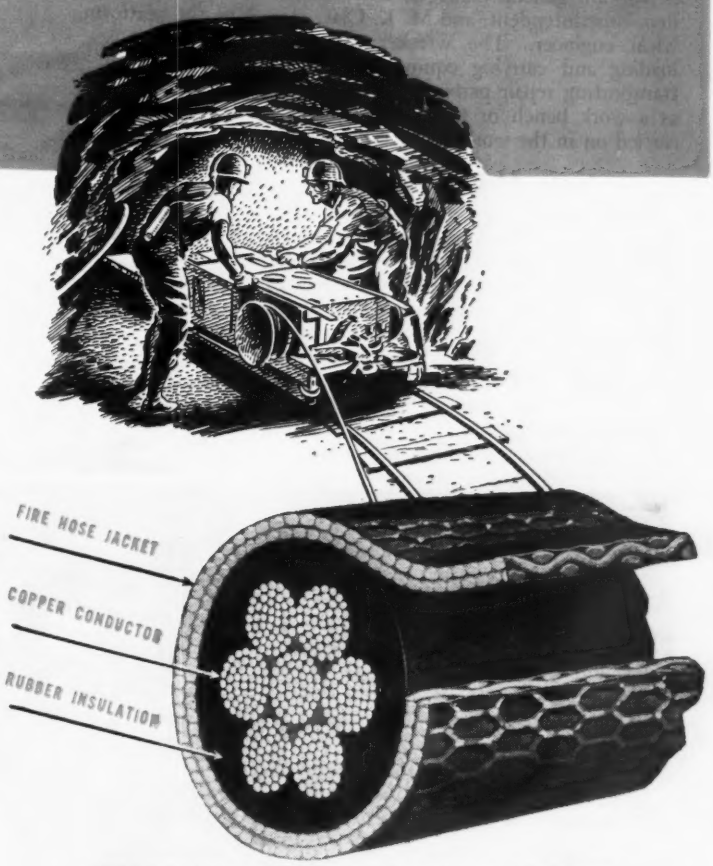
If the intake entrance is (1) a long way from any combustible material such as houses, tipples, breakers, offices, sheds, yards, etc.; (2) if it is itself wholly constructed of material that will not burn; (3) if there are no electric cables in the shaft, slope or drift with rubber jackets that may ignite and so create a blaze; (4) if there are no oily wastes such as car greasers and oilers, oil barrels and cans at the foot of the shaft or slope or in the drift; (5) if no combustible material is taken in or down by the intake entrance; (6) if there are no oil switches, transformers, motor generators, rotary converters, trolley or battery locomotives, to catch fire in the intake of the mine, and all possible sources of combustion are eliminated then, and then only, it is argued, can the power of reversal be omitted with safety. All the aforementioned precautions should be taken in any event, at least at newly constructed mines.

### Stoppage or Reversal

Others argue that the fan might be stopped rather than reversed. This in itself would bring about a reversal of the air current, for the heat of the fire if actually in the shaft or in a slope dipping from the surface (some few rise, as they enter the mine) would reverse the travel of the air. To prevent this, the fan would have to be run slowly to overcome the natural tendency of heated air to rise. But with an electrically driven fan as usually equipped this could not be done. In a drift, it would not be necessary, for there would be no difference of level to aid the air to travel. Speed regulation was possible with steam-engine drives, but very rarely has been provided with electric operation. It has been used to slow down the fan motor on idle days or between operating shifts; usually the State inspector did not approve this practice. It might serve to accelerate the fan when methane is freed from its hiding places by a fall of barometer.

# Fire-hose-jacketed Duracord

## ONE OF THE TOUGHEST, PORTABLE CABLES YOU EVER LAID DOWN IN A TUNNEL




DEVELOPED 25 years ago, Duracord has been time-tested and proved under the toughest conditions. The fact that it saves rubber in mining cable is only one of its present advantages.

Duracord is extra tough because it is covered with a Fire-hose Jacket.

This covering is *woven—not braided* . . . an important difference when it comes to strength and toughness. And it is imbedded in the belt, for extra tensile strength.

Duracord is *flexible*—easy to handle.

Duracord is engineered by mining cable specialists and quality-controlled from "raw material to finished cable."

Duracord is giving stand-out service in countless tough operations. More information on request from any of our sales offices.

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## Anaconda Wire & Cable Co.

# TIMELY OPERATING IDEAS

## Old Arcwall Rebuilt Into Self-Propelling Wrecker

INTRODUCTION of conveyors, mobile loaders and other new machinery coupled with the effects of the labor scarcity is hastening the development and installation of special trucks for servicing and transporting equipment. Making these trucks self-propelling so that their use does not tie up locomotives is gaining in favor.

An example is the wrecker shown in the accompanying illustrations. It is in use at No. 3 mine, Raleigh Coal & Coke Co., Raleigh, W. Va., where Ellsworth Shriver is assistant general manager; D. W. Warden, superintendent, and M. K. Clay, electrical engineer. The wrecker serves for loading and carrying equipment and for transporting repair parts and tools, as well as a work bench or table for repair jobs carried on in the working section.

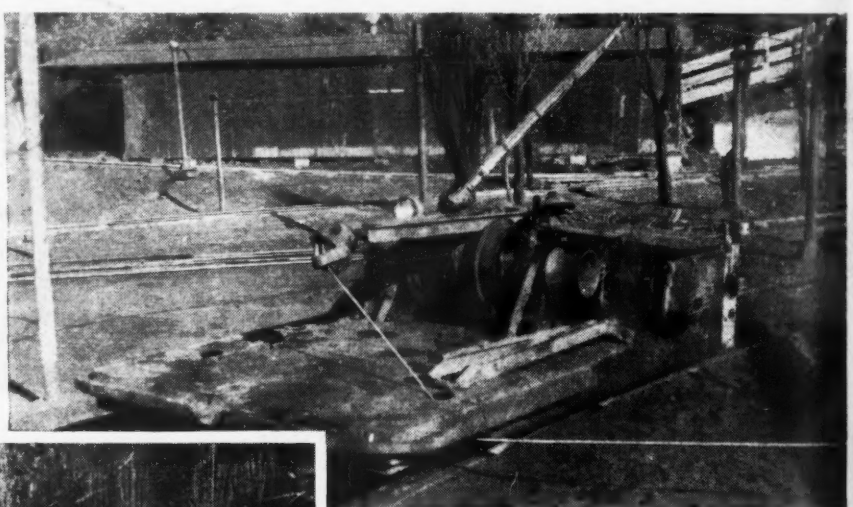
### Same Motor Is Used

This wrecker was built from the remains of a Jeffrey 29B arcwall cutter. Travel motor and its control were not disturbed. The bedplate was lengthened 24 in. and a 1,200-lb. weight was added under this extension to balance the other end of the wrecker. A hoist drum and boom were added. The former is fitted with 200 ft. of $\frac{3}{8}$-in. wire rope and the drive, at a rope speed of 30 f.p.m., is by a roller chain from the slow-speed sumping shaft.

The boom is raised and lowered by power by operating the rear adjusting screw, which was left in its original position. A swivel head sheave on the boom end adapts its position for pulling from any direction. For a side pull, as in dragging a pump or conveyor drive out of a room neck or breakthrough, the rope is threaded down through a hole in the bed and over a sheave mounted thereunder. Skids made of light rail are placed to facilitate pulling equipment up onto the bed. These skids have lugs which fit into slots at the edge of the platform.

The wrecker was built primarily for loading and carrying driving heads of chain conveyors. It has been in service only a short time but already has been used to good advantage in loading pumps and motors and in carrying cranks for Joy loading machines. Its use as a work bench in the section was adaptation rather than a planned use.

Raleigh workings are in the Beckley seam, where the thickness range is 24 in. to 7 ft. With the boom lowered the wrecker can safely traverse any entry tracked for other equipment.



**Wrecker with boom at full height. Also pictured are M. K. Clay (right), electrical engineer, and F. E. Hill, electrician. Upper right: Rope extending to right is threaded through a hole in the bed and over a sheave underneath to drag a piece of equipment. Right: Skids with lugs placed in a slot around the bed aid in loading equipment.**

# Washing Coal with HYDROSEAL PUMPS

**Recirculation of sand or sludge in cones or other hydraulic coal cleaning equipment is only one of the many money- and trouble-saving applications of Hydroseal Pumps in coal mines. Others include, (1) the pumping of tipple or breaker refuse or silt to storage pile or fill, (2) pumping coal in the moving of storage piles, to distant locations for storage or from mine to preparation plant, (3) reclaiming culm banks, (4) pumping overburden in hydraulic stripping operations, (5) cleaning muck from reservoirs, underground sumps, shaft bottom sumps and air shafts. . . . Photograph shows a D-Frame Hydroseal Pump which pumps water containing 7.5% solids into the Constant Head Box of a Koppers Rheolaveur. . . . The Hydroseal Principle of using clear water to keep abrasive solution from leaking back to the suction, plus Maximix Rubber which greatly outwears metal in the pumping of abrasives solutions assures low cost pumping under the most difficult conditions. Thousands of installations prove it. . . . Send for our 32-page Catalog No. 140 and learn what you can expect nowadays in abrasives pumping. Then, ask us to send one of our pump engineers to discuss your problems.**

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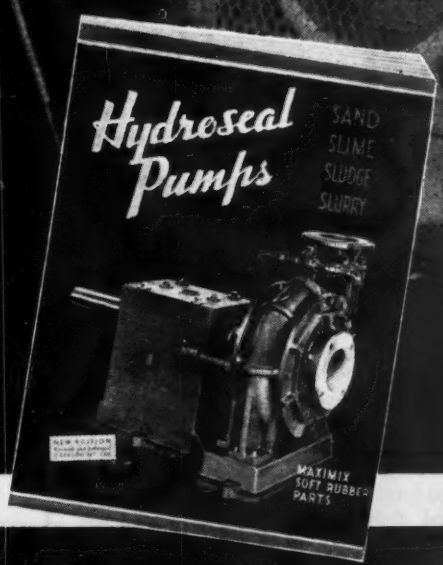


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# Multiple-Point Bits Used in Filling Wheel Treads

DULLED MINING-MACHINE BITS of the multiple-point type are used by a number of mining companies and some commercial welding shops as filler material for locomotive tires and wheels. A case of this conservation of alloy or high-grade steel is illustrated by the pictures made recently in the central shop of the West Virginia Coal & Coke Corp., Omar, W. Va.

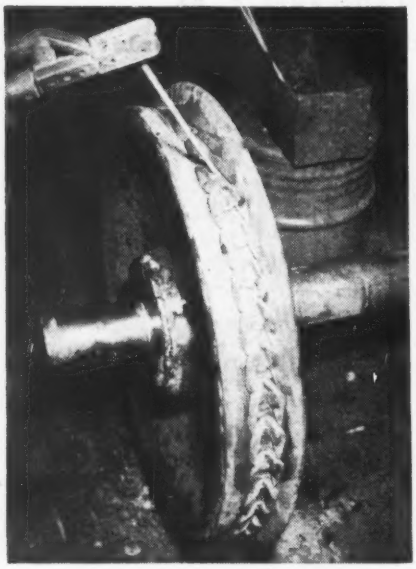
For some years that company has used rolled- or forged-steel wheels exclusively instead of wheel centers and tires and the regular practice had been to turn the treads to the limit, then replace with new wheels. Because of the war difficulty in getting new wheels, filling by welding was started about 18 months ago.

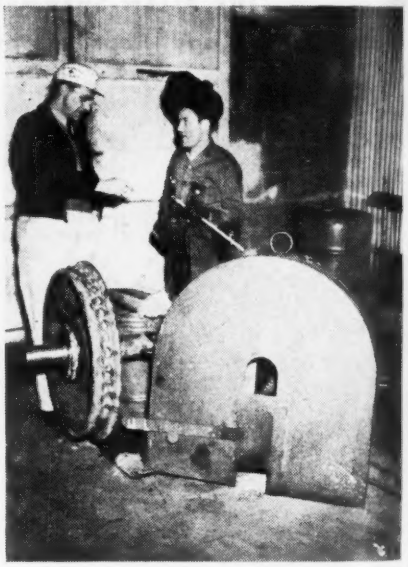
First, the bits (Cincinnati) are laid in the worn tread groove in double-herringbone fashion, then "tacked" into place. Success in the subsequent welding and filling lies in completely fusing these bits. The job is done with $\frac{1}{8}$-in. electrode (operated negative) using 500-amp. direct current furnished by a 600-amp. Lincoln motor-generator unit. It has been found that $\frac{1}{16}$-in. electrode is hardly large enough to facilitate fusing the bits completely.

Wheels are not preheated before the filling is started but the work of filling, once started, is completed without allowing the wheel to cool even though it carries on into the second shift (the shop works a night shift). As soon as the filling is completed the wheel is heated for annealing by an oil torch with the flame confined by a Hauck sectional shield. With the wheels resting on the floor the cooling is slowed by a sheet-metal hood which is put over the wheels. Axle slots on each side are closed by small steel plates.

Both main-line and gathering locomotive wheels are welded. The truck in the illustrations is from a General Electric 10-ton locomotive with 30-in. wheels. The satisfaction and savings indicate that the company will continue wheel welding after the war and probably will install automatic welding heads for the job.

In the same county, Logan, another coal company, which has its tires welded by a commercial shop, furnishes that shop with its dulled multiple-point bits for use as filling material. In this case, however, the bits are first tacked together to form a "filler stick." The electrode is operated positive and the filler fed into the arc.





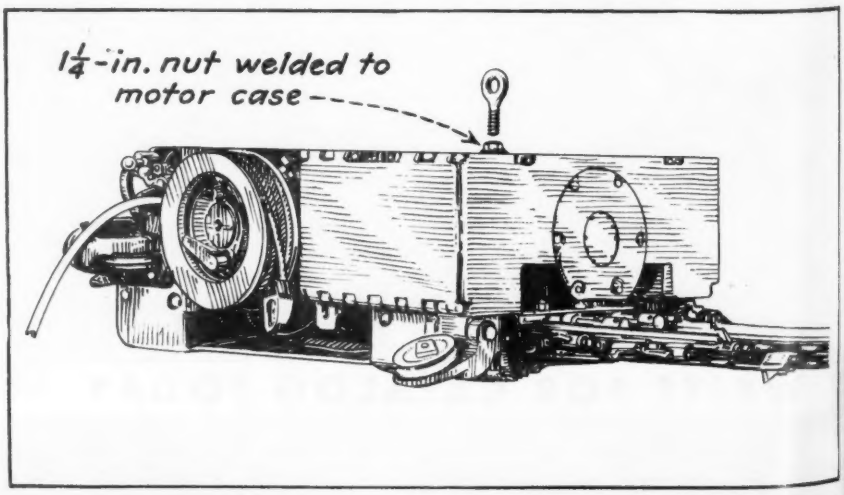
**Left: About to tack another group of bits into the groove. Center: Tacking the bits preparatory to filling the wheel. Right: Annealing hood with axle slot plate which will be placed over the wheel after the welding and final heating with a torch. This view also shows at the left C. L. Shelor, Omar shop superintendent, and Paul Strunk, welder.**

# Nut Helps Lift Shortwall Motor

LIFTING THE MOTOR of a Goodman cutting machine by a nut welded to its frame makes for safer maintenance, declares E. C. Hitchcock, night electrician, New River Co., Summerlee, W. Va.

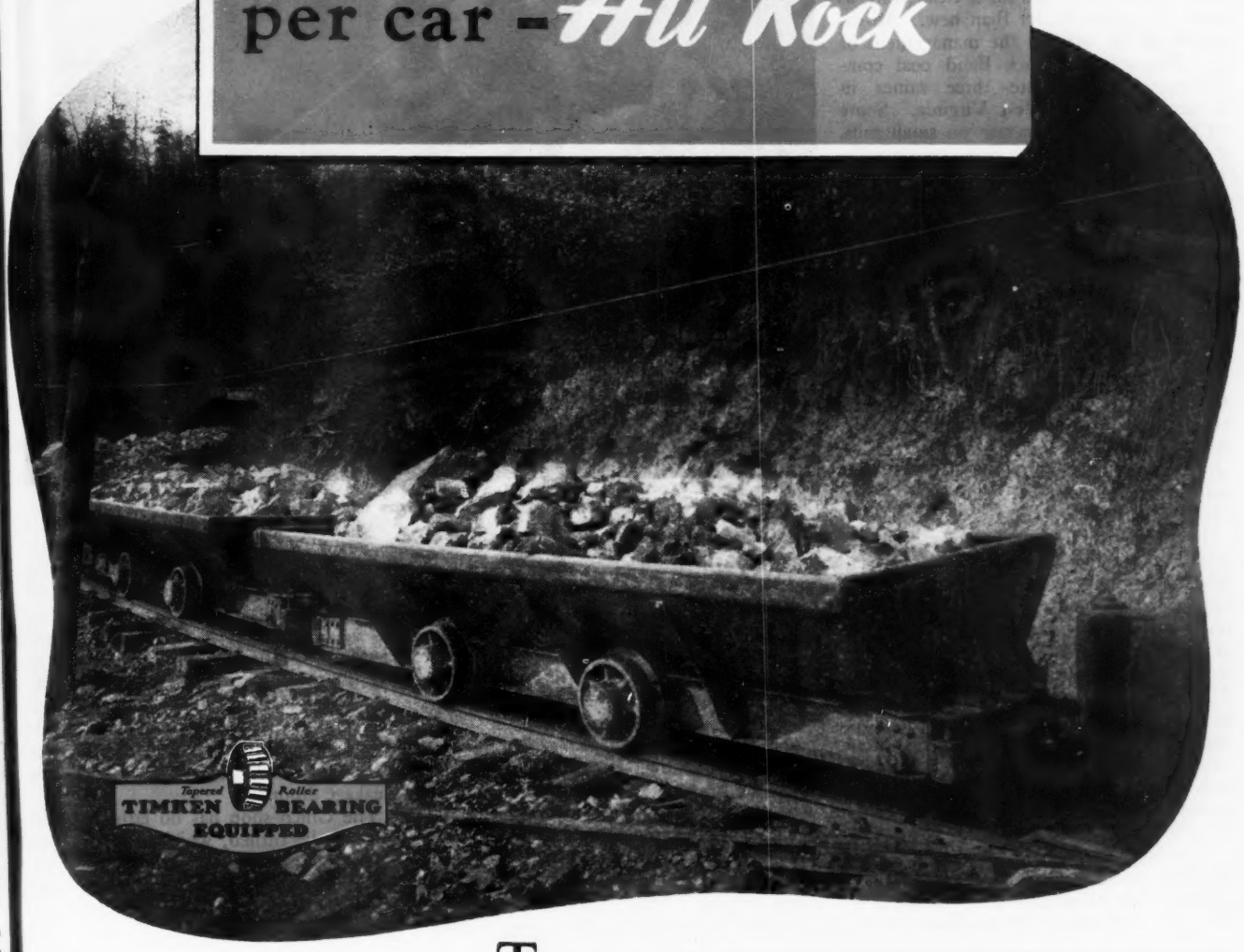
Welding a 1¼-in. nut to the frame of a cutting-machine motor, as shown in the accompanying diagrammatic sketch, and using an eyebolt to allow the motor to be lifted by chain blocks, is quicker and safer than the old method of using a chain sling. Furthermore, this method allows the motor to be raised slightly and shifted without having the chain slings in the way of bolting down the motor case.

Heading the motor in the manner described above, says Mr. Hitchcock, will save time and eliminate accidents.




**How nut facilitates lifting motor.**

# Average load, 6.3 tons per car – *All Rock*

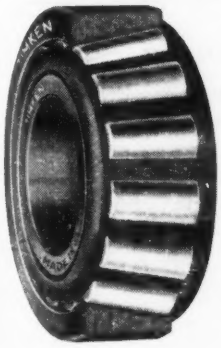



This photograph was taken at the Superior Cement Corporation, Superior, Ohio, but it is of interest to coal mine operators because it affords another demonstration of the value of Timken Bearing Equipped mine cars.

There are 95 of these large drop-bottom cars in service at this plant; 45 of them were placed in operation 7 years ago; the others have been in use 5 years.

An average load of 6.3 tons is carried by each car and approximately 1000 tons of material are handled per day. Cars are pulled by 13 ton locomotives on an average haul of 9600 feet.

Despite the severity of the conditions, the Timken Tapered Roller Bearings in these cars have given perfect service, to the great satisfaction of everyone concerned with their operation and maintenance. The Timken Roller Bearing Company, Canton 6, Ohio.



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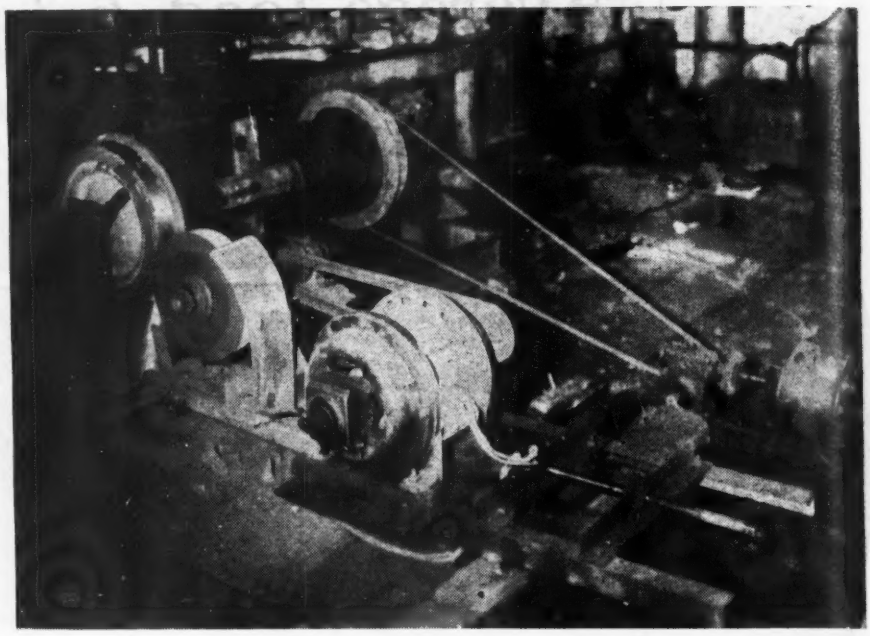
TAPERED ROLLER BEARINGS

# Tires Filled With Hard Steel and Finish Ground

PRACTICES in tire and wheel welding vary widely but the results are rather uniform except that some mining companies tolerate or prefer a tread much softer than new tires and others strive for a tread fully as hard as or even harder than new. An example of the latter is the management of the Dixport and Black Band coal companies, which operate three mines in Kanawha County, West Virginia. Some of the locomotives operate on small rails, over stiff grades and require considerable sanding, thus wearing the tires rapidly.

The welding is done in the mine shop at Cinco, using ¼-in. Hard Devil rod of 1.00 carbon content furnished by the Champion Rivet Co. and applied manually with a Lincoln 400-amp. shield-arc d.c. machine. The welding is preceded by "tacking" into the center of the worn groove a gage strip (½x½ in. or other suitable dimensions) to facilitate filling to approximate proper contour. The weld is hammered vigorously as sections 3 to 4 in. long are applied. Objects of this hammering are to relieve strains that might cause breakage and consolidate and smooth the surface of the tire before it goes into service.



**This grinding equipment was rigged at small cost.**

Finishing the hard surface is done by grinding in a machine rigged up by J. H. Markham, chief electrician and master mechanic. The cost of the grinding-wheel renewals is low because these are obtained as used items from an industrial concern wearing them down from a larger size to 15-in. diameter. They are coarse texture, medium to soft quality, and the face width is 3 in. The mounting is on a ball-bearing mandrel; speed is 1,800 r.p.m. and the drive is a 10-hp. motor that happened to be available—a 5-hp. probably would suffice.

The truck is rotated by a ¼-hp. motor working through a Cleveland worm gear reducer with its output shaft operating at 50 r.p.m. A single V-belt from a 5-in. pulley to the tread of the opposite wheel gives a peripheral speed of 15½ r.p.m., resulting in truck-rotating speeds in the range of 7½ to 14 r.p.m., depending upon tire sizes, which are 18-, 26-, 32- and 33-in. The grinding requires little attention—just a turn of the feed screw every few minutes.

H. H. Fletcher, manager of the companies, reported at the time the illustration was made that a small percentage of the tires broke after welding and that it was planned to rig up for annealing them. Breakage was almost nil in a ten-year period before 1941 when about 250 tires were welded. There were only two or three failures. Then, coinciding with the purchase of tires from a different source, breakage of tires mounted to an alarming figure. Although the earlier practice was to have a commercial man come in and weld the tires, using softer electrode, with vigorous hammering and no annealing, Mr. Fletcher sees evidence that the difficulty was due to a difference in quality or manufacture of the tires. He changed to purchasing the tires direct from the locomotive manufacturers and with that the breakage dropped.

The Cinco shop has no lathe in which tires can be turned, which in itself would be sufficient reason for adopting grinding. And because grinding can handle a hard tire about as well as a soft one, the harder electrodes are used.

# Hand Grips on Supply Bins Promote Safety

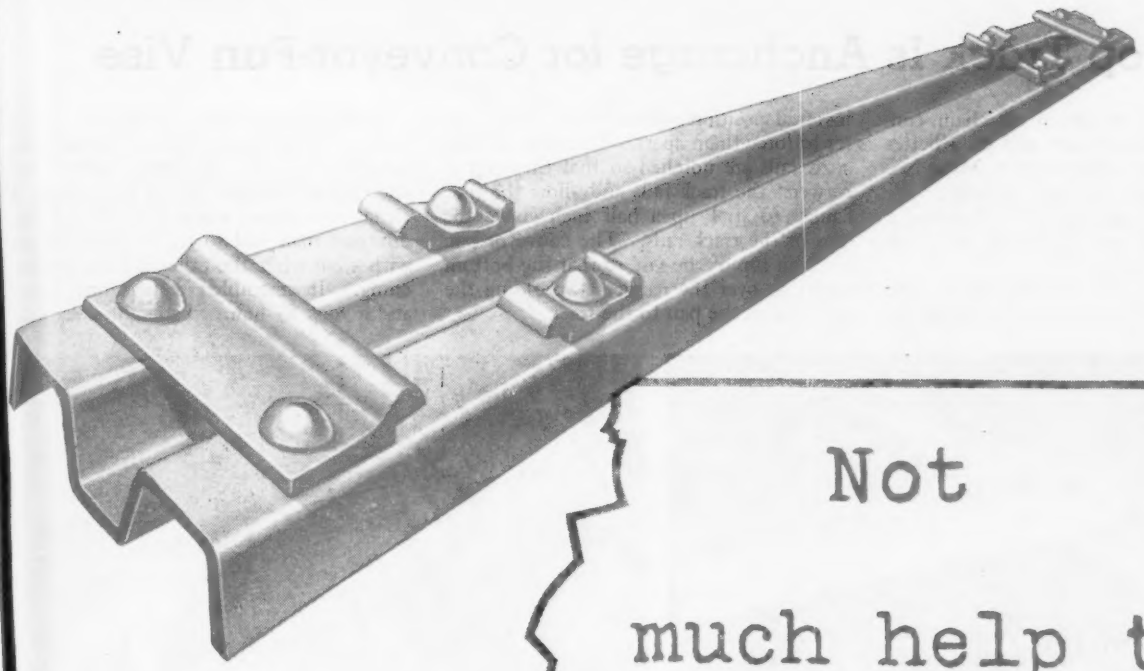
SAFETY IS PROMOTED in the supply houses at the mines of the Union Pacific Coal Co., Rock Springs, Wyo., by installing hand grips for the use of supply personnel. The accompanying illustration shows the hand grips, made of pipe and fittings, in place in the supply house at the Superior-D. O. Clark operation.

In addition to convenient arrangement and other details promoting efficiency and safety in storing and issuing materials, the best possible illumination is provided. This includes lighting fixtures especially designed for supply houses and installed to throw light down into even the top bins in a section.

**Pipe hand grips promote safety in Union Pacific supply houses.**

## *Shine a Light*

*Problems you have solved may still be bothering other operations. Perhaps your solution to an electrical, mechanical, operating or safety problem can help them. So send it in, together with a sketch or photograph if it will help to make it clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.*



# Not much help to the scrap pile

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BETHLEHEM STEEL

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Scrap metal is precious today. But Bethlehem No. 5 Steel Ties are a long time getting into the junk heap. They last too long to help the scrap pile grow very fast.

The durability of No. 5's is best shown by their actual service records in mines. It isn't at all unusual for these ties to be installed, taken up, and reused as many as twenty-five times.

Steel ties in a room-track layout bear the full weight of massive cutters and loaders—and of heavily-laden cars in a seemingly endless procession. Many ties, after a limited term of service, are ready to call it quits. But Bethlehem's No. 5 is built to stay in there month after month, taking the cruelest sort of abuse, without buckling out of shape.

It's a tie that is designed specifically for 40-pound rail; for the crushing loads of modern mechanized equipment. A heavy-duty unit, it has the thickness, depth, and all-around strength required by today's exacting service conditions. Weighing five pounds per foot of section, it is nevertheless so easy to handle that track-laying becomes a simple operation—even for inexperienced crews.

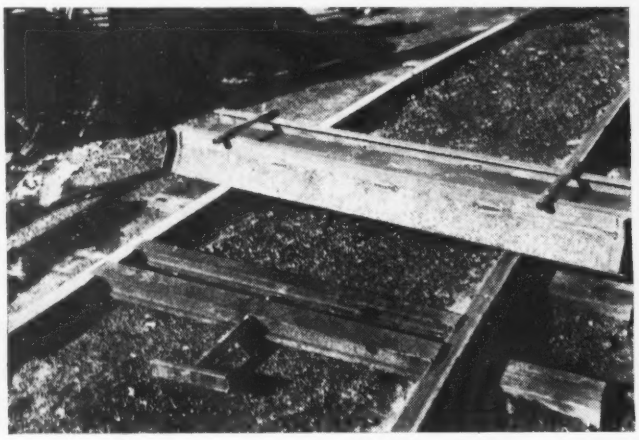
The No. 5 retains all the best features of other Bethlehem ties, including strong, riveted clips that automatically gauge the track. You'll find it on the job, doing its vital but unspectacular work, long after several sets of wooden ties have been discarded. For fewer replacements . . . lower track-laying costs . . . genuine overall economy...specify Bethlehem No. 5's on your next 40-pound rail job.

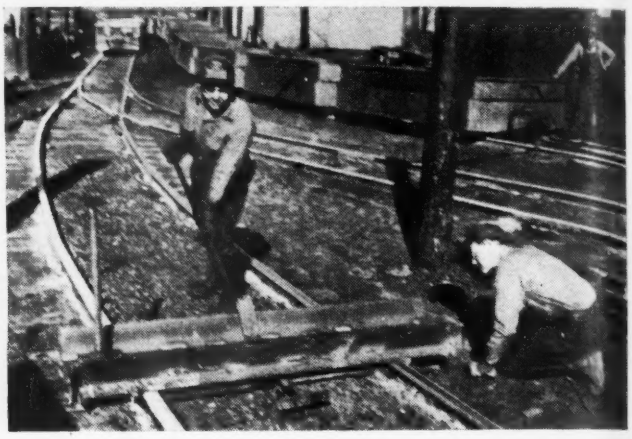
# Shop Track Is Anchorage for Conveyor-Pan Vise

Two men now straighten six chain conveyor pans in three hours and do a better job than formerly at Powellton Mine No. 3, Koppers Coal Division, Elkridge, W. Va. This was made possible by building a pan-straightening vise which uses the shop track as an anchorage.

As indicated in the first illustration, this vise consists of two cross rails placed in inverted position with a screw at the center to force them apart. The ends of these cross rails are notched so that they slip in between the track rails and allow the base flanges to stick up a half inch above the tops of the track rails. The conveyor pan is set on top of the vise so that the bottom angles go over the flanges. Spreading the rails secures the pan to the track.

Straightening then becomes a simple matter. One man wields a special long-handled bar and the other sights along the edge of the pan to tell him when. A sledge also is used where necessary. Formerly one man had to try to hold the pan with a bar while the other did the straightening. It resembled a wrestling match and it took 8½ hours to straighten six pans.





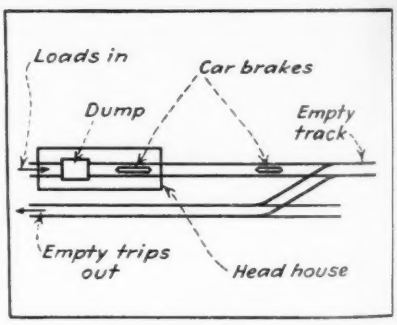
**Vise slipped in between rails so its top flanges will hook over the bottom angles of the pan. Right: Pan held securely while R. R. Mullins bends a flange with a long-handled bar to suit the eye of L. O. V. Eads.**

# Switch Stand Expands Auxiliary Rails to Brake Cars

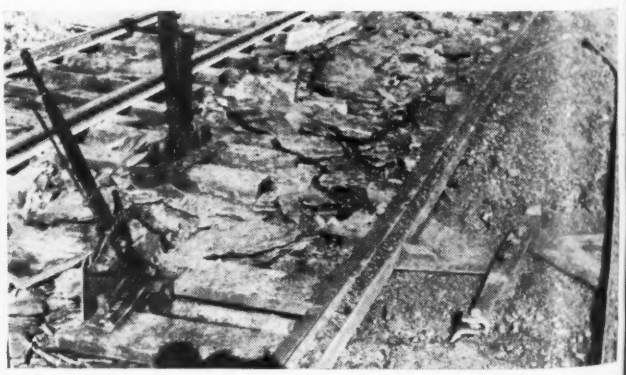
To slow and control gravity movement of empty cars from dumphouse to empty track or empty hole at the new upper-seam development of Guyan Eagle Coal Co., Amherstdale, W. Va., two braking installations are employed. These are of a type which more properly should be called "expanders" than "squeezers." Braking strips consisting of 70-lb. rails push out against the wheel flanges.

One brake is in the dumphouse and the other about 200 ft. downgrade and near a crossover connecting the empty hole and empty haulage tracks. With this arrangement, there is no need to interrupt dumping when a locomotive goes into the empty hole because the cars can be held temporarily at the second brake until the empty trip has moved out.

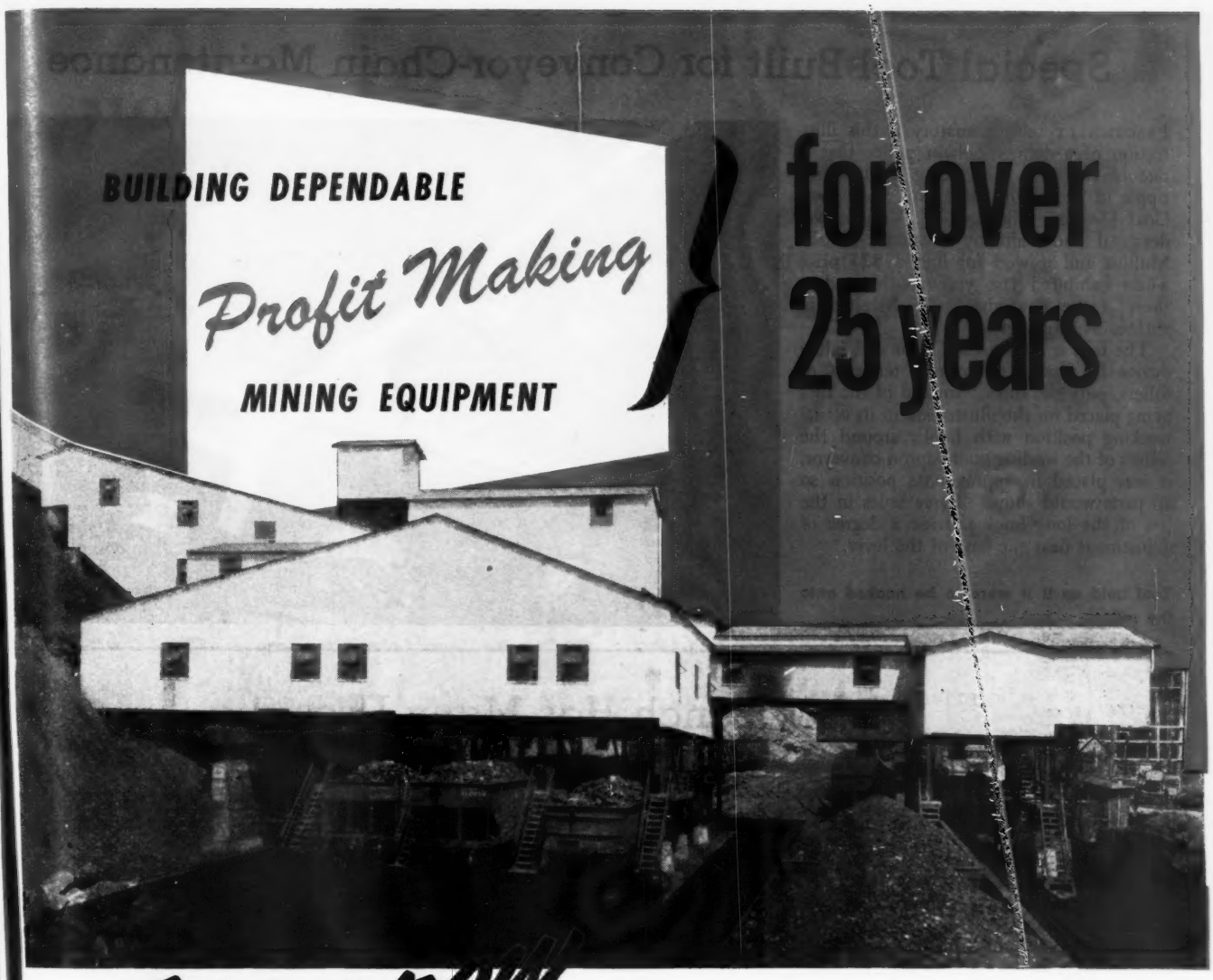
The 70-lb. expander rail is set on its side. The base flange on the upper side was burned off so it is no higher than the side of the ball. The expander is a toggle arm operated through a revised parallel-throw switch stand with spring rod made by the West Virginia Rail Co. (now West Virginia Steel & Mfg. Co.) A notching lever and quadrant were added to the switch stand. Both ends of the expanding brake rails are bent toward the center and the pairs of ends are connected by coil springs which allow the rails to move more or less bodily rather than by springing.




**The car brakes are farther apart than might be assumed from this off-scale drawing.**



**View before the job was completed. In addition to the car brake in the foreground there is another in the dumphouse in the background. Right: A notched lever was added to the parallel-throw switch stand. A spring rod is used. The center bolt of three at the right is attached to a baseplate anchored to the two track rails and this bolt is the fixed pivot for the toggle arm.**




# Morrow COAL TIPPLES

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**COAL TIPPLES and COAL HANDLING** *Equipment*

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Modernization of your operations NOW . . . will enable you to successfully meet the keen, cost-conscious postwar coal markets. Morrow engineers have the advanced "KNOW-HOW" for designing and building dependable equipment that will help you to reduce labor, maintenance and production costs . . . thus enabling you to keep your operations PROFITABLE.

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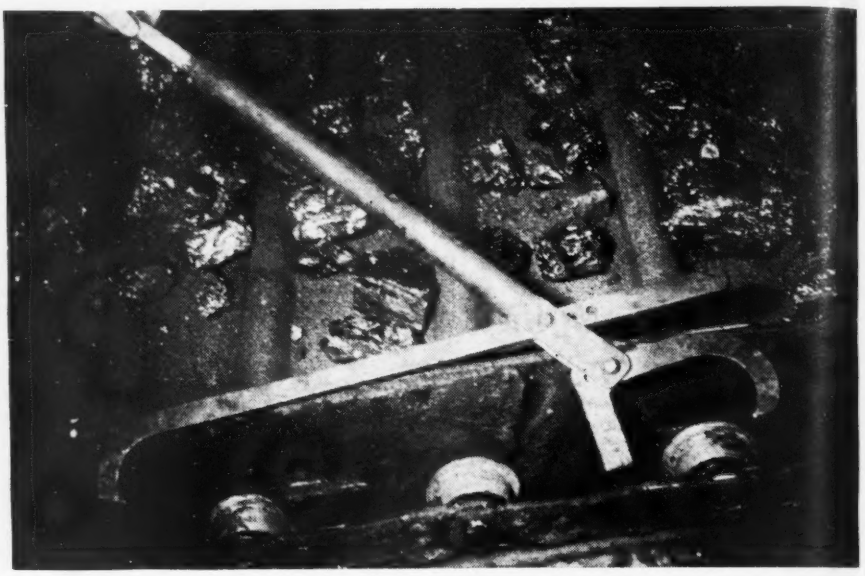
*Wellston, Ohio*

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

# Special Tool Built for Conveyor-Chain Maintenance

PRACTICALLY self-explanatory is this illustration of a conveyor-chain puller that is one of the new tools being used in the tipple of Powellton Mine No. 3, Koppers Coal Division, Elkridge, W. Va. It was designed and built by Mechanic R. R. Mullins and it won for him a $25 prize when exhibited last year at the gadget show of the Kanawha Valley Mining Institute, Montgomery.

The tool is both a time saver and safety device for use when making renewals of rollers, pins and links. Instead of the tool being placed for the illustration in its actual working position with hooks around the rollers of the loading-boom apron conveyor, it was placed in approximate position so all parts would show. Three holes in the bar of the long hook provide a degree of adjustment near the base of the lever.

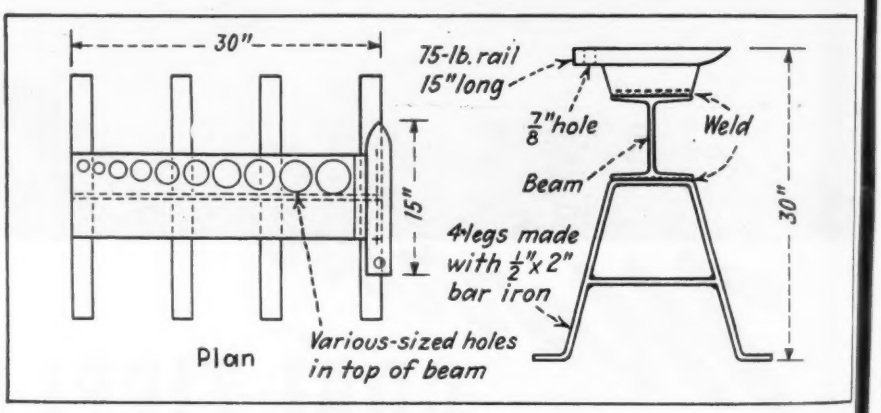


**Tool held as if it were to be hooked onto the rollers.**

# Work Bench Has Many Uses

A COMBINATION rail-anvil and narrow flat-top bench with punching-out holes has many uses around the shop, writes E. C. Hitchcock, night electrician, New River Co., Summerlee, W. Va.

The material necessary for such a bench, shown assembled in the accompanying sketch, normally is easy to obtain. In welding the short length of 75-lb. rail-anvil to the top flange of the steel beam, the base of the rail on one side should be cut back to the web to permit the web of the rail to be welded flush with the end of the beam. Holes are drilled along one edge of the top flange of the beam. The holes range from $\frac{7}{8}$ to approximately $3\frac{1}{4}$ in. in diameter and are for knocking out pins and bushings. The bench is arc welded.

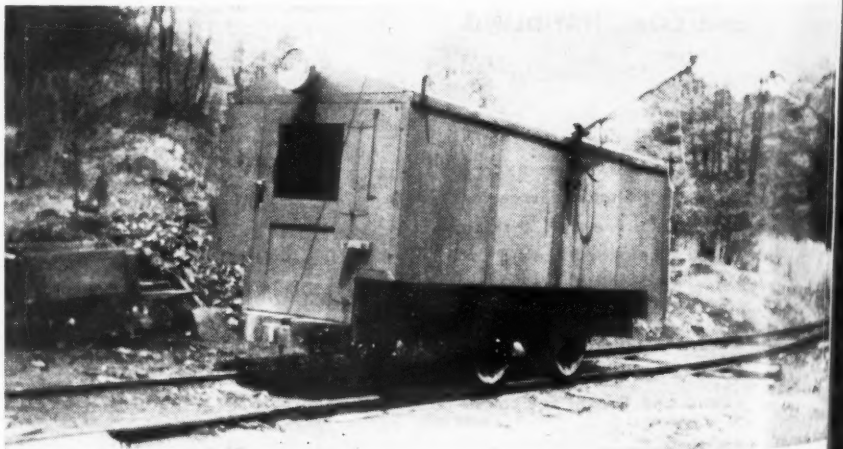



**How work bench looks when finished.**

# Man-Trip Car Protects Miners From Elements

A MAN-TRIP CAR seating 16 men comfortably, completely inclosed (oak frame and masonite sides), affording complete protection from the elements to miners in their ride from the tipple to the mine portal, a distance of three miles, nearly all outside haulage, has been designed and built by Ernest Weed, former electrician at No. 24 mine of the National Fireproofing Corp., Haydenville, Ohio. Mr. Weed is now serving with the U.S.N.R. The car is shown in the accompanying illustration, supplied, with the description, by J. E. Matheny, mine inspector, Logan, Ohio.

Measuring 12 ft. long, $4\frac{1}{2}$ ft. wide and 6 ft. high, the car is powered by a 5-hp. motor driving four V-belts, two to each axle. The end of the armature shaft opposite the pulley is equipped with a brake and another brake works on the wheels.



**Complete protection from the elements features this man-trip car for outside service.**

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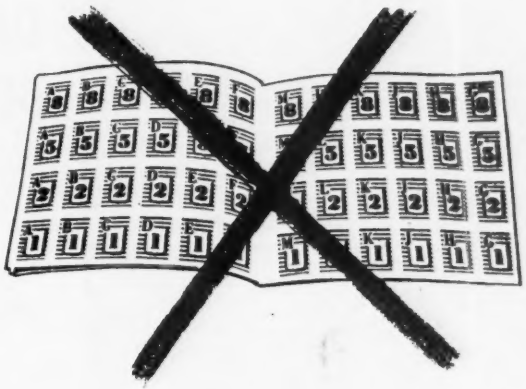
**Employees know that in a period of widespread rationing Fate never cuts down on**

## *MISFORTUNE*



DAILY your Employees face income-robbing emergencies that hit without warning. That's why leading Coal Mine Employers for decades have made it possible for their Employees to enjoy the benefits of the scientific protection afforded by a Provident HUMAN SECURITY Plan. These plans help Employees meet the extra expenses caused by such sure-to-happen emergencies as

**HUMAN SECURITY**

- **Death in family**
- **Loss of time due to Sickness or Accident**
- **Dismemberment**
- **Aiding dependents upon death of employee**

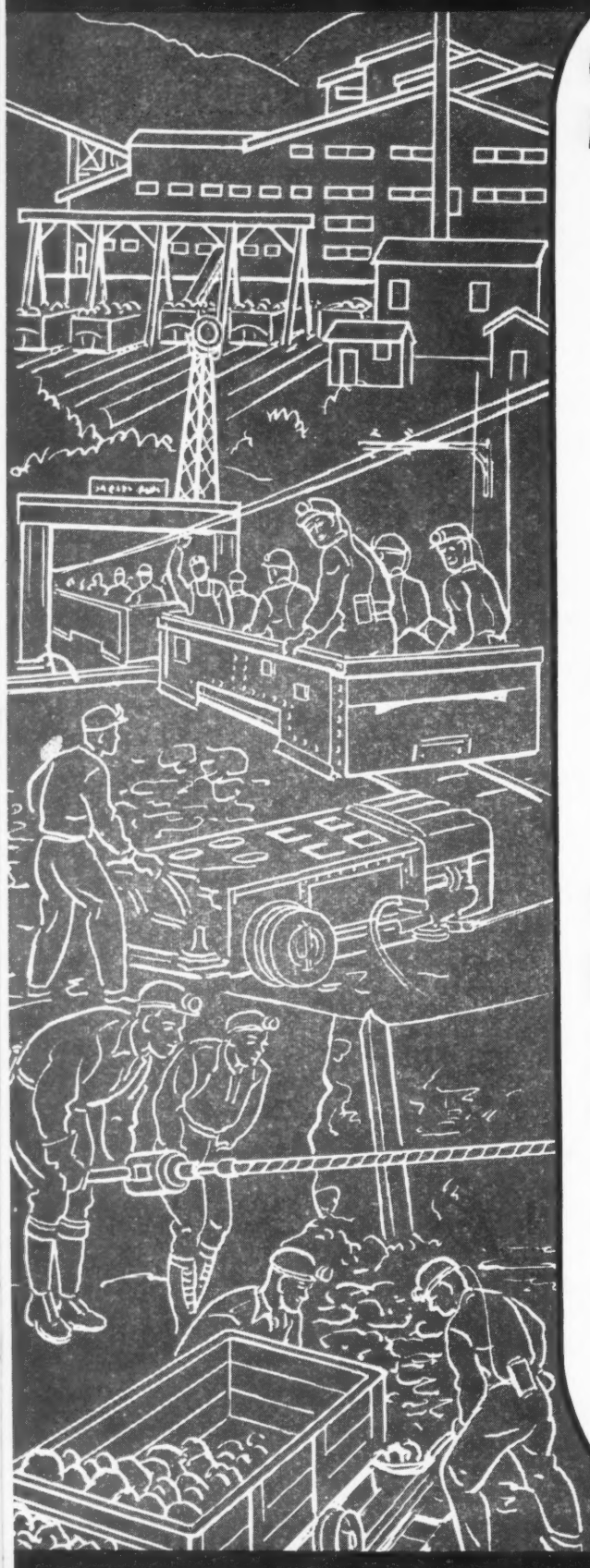
**EMERGENCY INCOME**

**PROVIDENT LIFE AND ACCIDENT INSURANCE CO.**

**CHATTANOOGA 2 — SINCE 1887 — TENNESSEE**

• Pioneers in bringing **Human Security Protection** to Coal Mine Employees.

# AMERICA'S UNDERGROUND ARMY NEEDS *HELP!*



## *OFFSET MANPOWER LOSSES WITH BETTER COAL CUTTING EQUIPMENT*

# CINCINNATI Chains and Bits Help Lick Manpower Problem

**Cincinnati TIME TESTED Duplex Chains and Bits help mine operators offset manpower problem. Here's why!**

- **Cincinnati Duplex Bits ELIMINATE BIT SHARPENING OPERATIONS at the mine which saves valuable manpower.**
- **Cincinnati Duplex Bits reduce BIT HAULING TIME of Mine Sharpened Bits by approximately 90%.**
- **Bit setting time reduced 75% with each point on the Duplex Bit outcutting from 2 to 6 ordinary Mine Sharpened Bits.**
- **Cincinnati trouble free DUPLEX CHAINS, BITS and BARS require little servicing and reduce shutdowns to a minimum.**

Hardened Eccentric Pin is designed so it can't turn in block . . . placing Joint Wear between pin and insert.

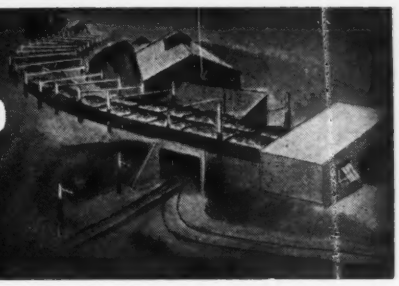
Replaceable long-life, hardened alloy steel Connector Insert that gives new factory joint accuracy to a worn connector.

Alloy Steel heat-treated Rivet that holds bearing pin against longitudinal displacement. Easily removed.

# THE CINCINNATI MINE MACHINERY CO.

**2983 SPRING GROVE AVENUE • CINCINNATI, OHIO**

# COAL AGE NEWS ROUND-UP



## U.M.W. Drives for Foremen's Pacts; Philadelphia & Reading Mines Seized

A BROAD-SCALE CAMPAIGN to force recognition of the foremen's union of the United Mine Workers of America was paralleled by a wave of strikes in August and renewed application of the principle of seizure to halt work stoppages. Properties taken over in the latest seizures were those of the Philadelphia & Reading Coal & Iron Co. in the southern anthracite region, where a strike over the method of paying "make-up" wages had kept 4,000 men and three operations of the company idle for eight weeks despite the efforts of union, company and government officials to bring it to an end, and 15 mines operated by six Pennsylvania bituminous companies (supervisory strikes).

The P. & R. seizure was ordered by President Roosevelt Aug. 23. Eight mines of the Rochester & Pittsburgh Coal Co. and two of the Ford Collieries Co. were ordered seized Aug. 31. On Sept. 3, seizure of additional properties was directed as follows: Heisley Coal Co., 1; Imperial Coal Corp., 1; Monroe Coal Mining Co., 1; Springfield Coal Corp., 2. Additional seizures were expected as the taking of strike votes among supervisors resulted in additional stoppages. Reports were, however, that the government would refuse to recognize the foremen's union at properties taken over.

Meeting defeat before the National Labor Relations Board in June, the United Clerical, Technical and Supervisory Employees' Union of the Mining Industry, Division of District 50, United Mine Workers of America, switched its approach through the Department of Labor and the National War Labor Board in August, and by Aug. 23 had been successful in getting 69 cases covering mines in Pennsylvania, West Virginia and Kentucky certified to WLB.

The procedure was based on serving on the Department of Labor a notice of intention to strike within 30 days under the provisions of the War Labor Disputes Act, alleging refusal to recognize the union and bargain collectively on rates of pay, hours of work and other conditions of employment, as well as violations of alleged fair labor practices. The Department of Labor in turn certified the cases to WLB.

The curtain raiser in the renewed campaign of the District 50 foremen's union, which took over the Mine Officials Union of America (Ind.) on April 1, 1943, was the Rochester & Pittsburgh Coal Co. case. The Mine Officials' union had organized the company's technical and supervisory employees in 1941, and its successor, on Nov. 13, 1943, asked the company for formal recognition as bargaining representative and later filed its original petition with NLRB on Jan. 13, 1944. As amended, NLRB dismissed the petition in June on the ground that earlier decisions had condemned "the representation of ordinary employees and supervisory employees by the same labor organization, both because of the inherent threat to the freedom of choice by ordinary employees and because of the irreconcilable and conflicting positions in which such affiliations would place supervisors."

The next step of the union was to have cases covering R. & P. and the Ford Collieries Co. certified to WLB, with a corollary the taking of strike votes by NLRB. The first was taken at Ford Collieries on the question: "Do you wish to permit an interruption of war production in wartime as a result of the dispute?" The vote was 26 "yes" and 13 "no." Six additional polls were taken at R. & P. Aug. 19, with the following results:

| | Yes | No |
|---|---|---|
| Lucerne | 11 | 24 |
| Kent 1 and 2 | 21 | 19 |
| Kent 4 | 2 | 10 |
| Ernest | 38 | 29 |
| Yatesboro | 18 | 10 |
| Sagamore | 6 | 13 |
| Waterman 2 | 11 | 16 |

With strike notices expiring Aug. 30 and Sept. 1, 2, 5, 6 and 7, some 62 additional cases were certified to WLB as amendments to the R. & P. and Ford Collieries cases up to Aug. 22. Companies and number of cases were reported as follows:

| PENNSYLVANIA | |
|---|---|
| Consumers Mining Co. | 1 |
| Heisley Coal Co. | 1 |
| Hillman Coal & Coke Co. | 1 |
| Imperial Coal Corp. | 1 |
| Monroe Coal Mining Co. | 1 |
| Northwestern Mining & Exchange Co. | 1 |
| Pennsylvania Coal & Coke Corp. | 4 |
| Republic Steel Corp. | 1 |
| Springfield Coal Co. | 2 |
| Union Collieries Co. | 2 |
| Red Lands Coal Co. | 1 |

| WEST VIRGINIA | |
|---|---|
| Arkwright Coal Co. | 1 |
| Cannelton Coal Co. | 1 |
| Christopher Coal Co. | 4 |
| Consolidation Coal Co. | 5 |
| Crab Orchard Improvement Co. | 2 |
| Davis-Wilson Coal Co. | 1 |
| Koppers Coal Div. | 3 |
| Glendale Gas Coal Co. | 1 |
| Hitchman Coal & Coke Co. | 1 |
| Industrial Collieries Corp. | 4 |
| Jamison Coal & Coke Co. | 1 |
| Kelleys Creek Colliery Co. | 1 |
| Leccony Smokeless Coal Co. | 1 |
| Lillybrook Coal Co. | 4 |
| C. H. Mead Coal Co. | 3 |
| Milburn By-Products Coal Co. | 1 |
| Pursglove Coal Co. | 1 |
| Raleigh-Wyoming Mining Co. | 2 |
| River Seam Coal Co. | 1 |
| Valley Camp Coal Co. | 3 |
| Virginia-Pittsburgh Coal Co. | 1 |
| Wyatt Coal Co. | 1 |
| Wyoming Coal Co. | 1 |

| KENTUCKY | |
|---|---|
| Eastern Coal Corp. | 1 |
| Octavia Coal Mining Co. | 1 |

Some 35 bituminous mines were on

## COAL ACTIVITY

### Bituminous Coal Stocks

Thousands

| | Net Tons July 1 1944 | P.c. Change From June 1 1944 | P.c. Change From July 1 1943 |
|---|---|---|---|
| Electric power utilities | 16,457 | +4.7 | −12.6 |
| Byproduct coke ovens | 6,152 | +4.4 | −13.9 |
| Steel and rolling mills | 785 | +3.2 | −20.8 |
| Railroads (Class I) | 13,330 | +13.6 | +11.6 |
| Other industrials* | 17,536 | +6.3 | −38.0 |
| Total | 54,260 | +7.3 | −19.2 |

### Bituminous Coal Consumption

Thousands

| | Net Tons June 1944 | P.c. Change From May 1944 | P.c. Change From June 1943 |
|---|---|---|---|
| Electric power utilities | 6,163 | +5.4 | +2.3 |
| Byproduct coke ovens | 7,778 | −4.4 | +8.2 |
| Steel and rolling mills | 778 | −6.2 | −5.6 |
| Railroads (Class I) | 10,229 | −5.6 | +3.8 |
| Other industrials* | 10,343 | −6.8 | −9.2 |
| Total | 35,291 | −4.0 | +0.6 |

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

### Bituminous Production

| | |
|---|---|
| July, 1944, net tons | 48,930,000 |
| P.c. change from July, 1943 | −6.3 |
| Jan.-July, 1944, net tons | 368,015,000 |
| P.c. change from Jan.-July, 1943 | +9.1 |

### Anthracite Production

| | |
|---|---|
| July, 1944, net tons | 5,016,000 |
| P.c. change from July, 1943 | −11.9 |
| Jan.-July, 1944, net tons | 38,172,000 |
| P.c. change from Jan.-July, 1943 | +8.9 |

### Sales, Domestic Stokers Vs. Oil Burners

| | Stokers | Burners |
|---|---|---|
| June, 1944 | 3,177 | 2,976 |
| P.c. change from June, 1943 | +50.8 | +155.2 |
| January-June, 1944 | 12,336 | 14,594 |
| P.c. change from Jan.-June, 1943 | +4.4 | +63.0 |

### Index of Business Activity *

| | |
|---|---|
| Week ended Aug. 19 | 234.4 |
| Month earlier | 235.3 |
| Year earlier | 237.0 |

* *Business Week*, Aug. 26.

### Electric Power Output †

| | |
|---|---|
| Week ended Aug. 19, kw.-hr. | 4,451,076,000 |
| P.c. change from month earlier | +15. |
| P.c. change from year earlier | + 4.4 |

† Edison Electric Institute.

strike as of Aug. 21. At least five (Francis and Berry, of Ford Collieries, and Kent 1 and 2 and Yatesboro, R. & P.) were in support of attempts to gain recognition for the foremen's union. Total number of employees affected was reported as 2,441. John McAlpine, president of the foremen's union, rejected a WLB order to call off the Ford Collieries stoppages. A strike involving 1,046 men at Vesta No. 5 mine, Jones & Laughlin Steel Co., was reported to have been called to force the bosses to organize. In Virginia, 991 employees at the Imperial, Monarch and Mayflower mines, Blue Diamond Coal Co., struck in support of store employees, who were reported to be seeking a union contract. Other operations on strike Aug. 21 included:

| | |
|---|---|
| **PENNSYLVANIA** | |
| Hillman Coal & Coke Co., No. 2 | 125 |
| Crucible Steel Co. | 750 |
| Miller Coal Co. | 32 |
| Rendmar Coal Co., No. 9 | 170 |
| Heisley Coal Co. | 1,047 |
| Republic Steel Co., Clyde 1 and 2 | 1,030 |
| **OHIO** | |
| Peacock Coal Co. | 100 |
| Jackson Mining Co. | 196 |
| **WEST VIRGINIA** | |
| Chafin-Jones-Heatherman Coal Co. | 145 |
| Detroit Mining Co., No. 2 | 198 |
| **KENTUCKY** | |
| Kentucky Darby Coal Co., Pennington | 50 |
| Bevier-Lamb Mining Co., No. 1 | 117 |
| Octavia Coal Co. | 261 |
| Pioneer Coal Co. | 195 |
| Louisville Gas & Electric Co. | 122 |
| **TENNESSEE** | |
| Tennessee Jellico Coal Co. | 140 |
| High Point Coal Co. | 82 |
| Tennessee Products Corp. | 425 |
| **ARKANSAS** | |
| Excelsior Thin Vein Coal Co. | 100 |
| Ruby Glow Mining Co. | 165 |

•

## Bituminous Control Urged by Roosevelt

A letter from President Roosevelt urging early passage of legislation again regulating the bituminous coal industry was made public Aug. 16 by Representative John Flannagan of West Virginia. The President expressed the opinion that better results would be obtained under a single head within one of the executive departments rather than an independent commission.

Legislation pending in the House and Senate (including S. 2083 and S. 2084, introduced Aug. 18) proposes a commission of five members, with three representing the public, whereas the original board had three members.

The President's letter to Representative Flannagan, dated Aug. 12, follows:

"I am glad to learn from you that bills are pending in the Congress which, if enacted, would reinstate price regulation and rules of fair competition for the bituminous coal industry.

"As you know, I actively sponsored such legislation which was enacted by the Congress in 1935, and again in 1937. This legislation has now expired. Under it the bituminous coal industry was cured of its chaotic sickness and put on the road to recovery. Thousands of miners who had known only low wages and poor working conditions were enabled for the first time to earn a decent livelihood. At the same time, consumers were protected and prices held to a steady and reasonable level.

"The passage of similar legislation at an early date is, in my opinion, important to the welfare of the nation. During wartime, the bituminous coal industry has enjoyed a reasonable measure of prosperity. But, when the present boom market ends, chaos will again threaten if the industry returns to the old ways of cutthroat competition. The industry will, of course, feel the harmful results of this instability. But hundreds of thousands of miners will also suffer irreparable injury, and consumers will obtain no lasting benefit. Sound legislation, on the other hand, will help stabilize the industry and safeguard the interests of thousands of producers, hundreds of thousands of miners and millions of consumers.

"There has always been a difference of opinion as to whether legislation of this character would better be administered by an independent commission or by an executive department. Experience has demonstrated to my own personal satisfaction that better results have been and will be obtained under a single head within one of the executive departments. This, however, is a matter upon which reasonable men may differ while agreeing upon the importance of the basic principle involved."


**SAVE PAPER TODAY**

**Don't postpone paper saving until you can do "a big job of it" tomorrow. Save what you can today! Every hour is precious—the last hour of World War I cost the Allies 5,000 men. Salvage old papers, magazines, circulars, letters, file copies, wrapping paper—it all means shell, food and blood-plasma cartons our fighting men must have NOW—not tomorrow.**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## Bureau Engineers To Help Boost Output

Two engineers of the U. S. Bureau of Mines have been assigned to help operators in the Pennsylvania anthracite field increase production in 1944 by the wider use of mechanical equipment and by preventing flooding of underground workings, according to an announcement Aug. 17 by Secretary of the Interior Harold L. Ickes. Confronted with the task of producing about 66,000,000 tons of hard coal this year as against 60,000,000 tons in 1943, the anthracite operators have requested the assistance of the government on this problem, Mr. Ickes said.

S. H. Ash and John W. Buch, mining engineers with long experience in the hard-coal fields and now of the Bureau's Anthracite Investigations Section, have been selected by Dr. R. R. Sayers, director, to direct the survey in cooperation with a committee representing the Commonwealth of Pennsylvania, the United Mine Workers of America, and the Pennsylvania anthracite operators. Funds to initiate the work have been approved by Congress and the program will be conducted from a new field office being established at Wilkes-Barre, Pa.

**"Jim's working on double time now!"**

By using big rubber-tired Tournapulls with LeTournaeau 15-yd. Carryall Scrapers, you get more speed—up to 14.9 m.p.h.—to more profitably move overburden over long hauls. Tournapulls steer and operate like a track-type tractor, flotation of big rubber tires enable them to work practically anywhere a tractor will go. Over 2000 now in use; investigate the profit possibilities fast-moving Tournapulls offer you.

# 4 REASONS WHY LeTOURNEAU CARRYALL SCRAPERS CAN LOWER YOUR STRIPPING COSTS

**TAKE full advantage of the economies of open pit coal mining by stripping with LeTourneau Carryall Scrapers — either tractor or Tournapull operated. Used today by scores of successful operators. Here's why—**

**SELF-CONTAINED**—Carryall excavates its own loads, then hauls and spreads those loads of overburden in one continuous operating cycle. One man operates both Carryall and prime mover.

**GREATER OPERATING RANGE**—Carryalls are not limited by boom or casting length. With them you can move overburden beyond range of future operations . . . thus eliminate rehandling and eliminate danger of spoil sliding back into pit.

**EFFICIENT ON BOTH LIGHT AND HEAVY OVERBURDEN**—LeTourneau Carryalls strip big loads as efficiently on 6 inches of overburden as they do on a 30-foot layer. This reduces clean-up time . . . enables most mine owners to handle the entire stripping job with Carryalls; others use this method for stripping excess overburden down to profitable shovel reach.

**EXTRA USES**—In addition to stripping, you can use your LeTourneau Carryall Scrapers to:

- ★ BUILD AND MAINTAIN BETTER HAUL ROADS
- ★ LEVEL TIPPLE SITES
- ★ RECLAIM CULM
- ★ MOVE AND LEVEL SPOIL BANKS
- ★ STOCKPILE COAL
- ★ DIG DRAINAGE DITCHES

**Investigate the LeTourneau Carryall method of stripping NOW. You'll save money on both manpower and equipment investment — no big, expensive loading equipment or extra trucks needed when you use Carryalls. Our Field Engineering Department will gladly prepare plans and estimates to fit your operation. Call on them TODAY.**

**LETOURNEAU**

Manufacturers of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD* TOURNACRANES*.

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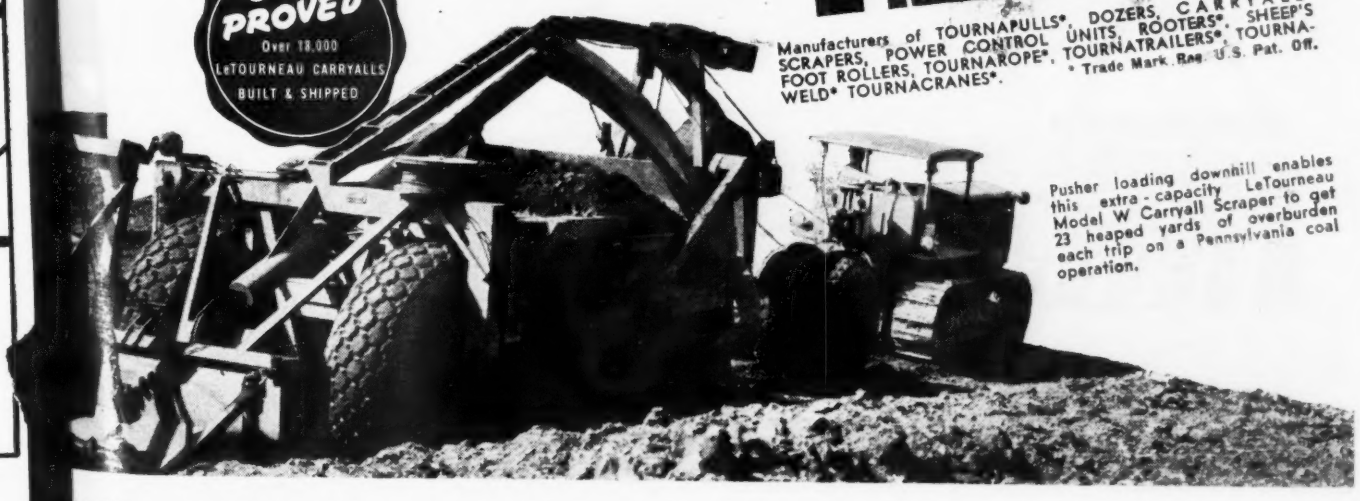
JOB-PROVED
Over 13,000
LeTOURNEAU CARRYALLS
BUILT & SHIPPED



Pusher loading downhill enables this extra-capacity LeTourneau Model W Carryall Scraper to get 23 heaped yards of overburden each trip on a Pennsylvania coal operation.

# New Principle Assures Efficient Heat

## *Anthracite Laboratory Shows New Principle of Burning Hard Coal Promising More Efficient and Economical Heat for Post-War Use*

PROMISING increased markets for anthracite in the future, a new development in economical, completely automatic, highly compact anthracite heating was demonstrated to home-heating equipment manufacturers at the Anthracite Industries laboratories at Primos, Pa., Aug. 16. Stated to be of far-reaching significance to the five million homes which now depend upon anthracite for heating and the hundreds of thousands of new homes which will be built in the post-war era, the new development substitutes a concentrated, fast-burning fire of great intensity for the method of burning anthracite slowly in a firebox of relatively large size.

Utilization of the new principle will make it possible, according to Frank W. Earnest Jr., president of Anthracite Industries, Inc., for manufacturers to produce in the early post-war period an automatic unit, suitable for heating the average size home, that can be inclosed in a space less than 2x2x3 ft. This unit, he stated, can be sold and installed for considerably less than equipment now in use for any type of domestic fuel.

In contrast to present home-heating equipment, which burns anthracite at the maximum rate of approximately 10 lb. per square foot per hour, the new development makes it possible to burn 50 to 60 lb. per square foot per hour, liberating more than 500,000 B.t.u. per cubic foot, as compared to approximately 50,000 liberated with present-day equipment. As a result, the heat absorption per square foot of heating surface is raised from 6,000 B.t.u. to 40,000 or 50,000, with a reduction in the total quantity of coal consumed during the heating season.

Although the new principle has not yet been incorporated in equipment available to the consumer, a number of manufacturers already are working on designs for its application in both the home and industrial field.

"In addition to the advantages it offers the home owner by combining compactness and automatic operation with the economy of heating by anthracite," Mr. Earnest said, "this new development promises to have an important effect on the future of the anthracite industry, expanding the market for its product and greatly increasing the number of jobs it will be able to provide after the war."

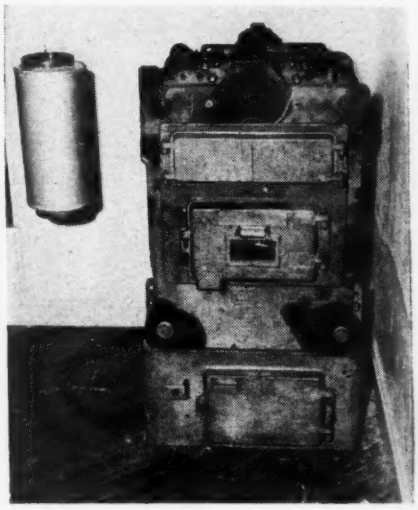
Equally effective with either hot-water, steam or warm-air systems, the mechanism for applying the new principle is simplicity itself. It consists of a hollow tube 6 or 8 in. in diameter and approximately 18 in. long. The anthracite is fed into the tube automatically; the coal burns in the center of the tube, and the ash is discharged at the other end. Water or air, circulated around the hot part of the tube in a small, compact jacket, carries the heat throughout the house in the same manner in which it is distributed by present-day heating systems.

"The principle is founded upon a basic characteristic of anthracite combustion which has been confirmed by research in the laboratory," Dr. Raymond C. Johnson, vice president in charge of research for Anthracite Industries, explained. "Anthracite, unlike most other fuels, under proper conditions can be made to burn to complete and perfect combustion within its own area without the necessity for secondary air or secondary combustion spaces.

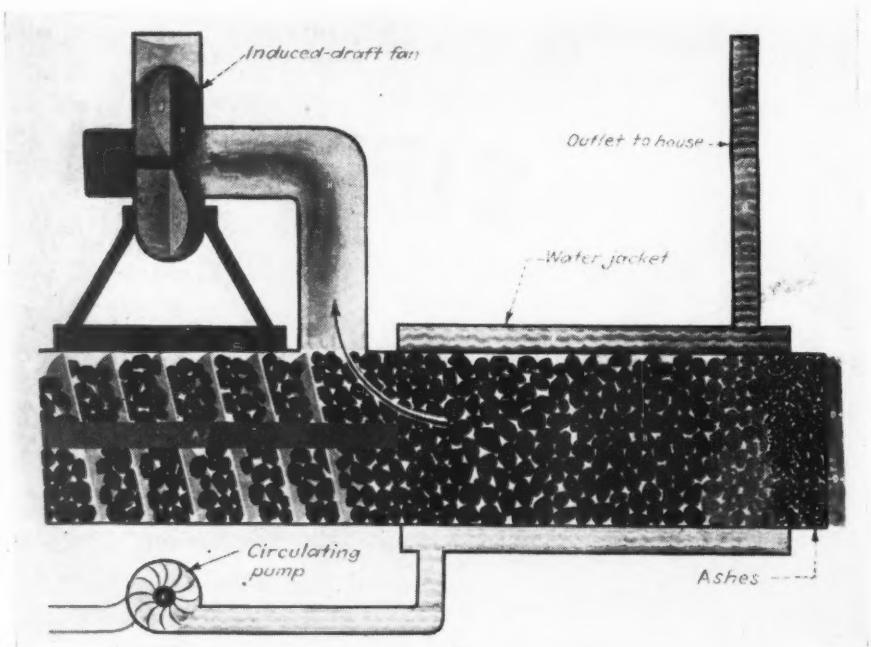
"Heretofore practically all heaters were designed with large grate areas with extensive combustion space above the fire bed so that the large quantities of carbon monoxide which were formed could be burned above the bed with secondary air. As a result, this equipment contained several times the bulk and weight that is necessary in a furnace especially designed to take advantage of anthracite's particular combustion requirements. The complete absence of complicated flue passes or secondary heat-absorbing surfaces in this new method of burning does not lower efficiency, because the heated products of combustion flow through the cold incoming coal to stimulate ignition and to use the coal as an economizer, replacing conventional secondary heating surfaces.

"The efficiency is further heightened by the fact that the coal cannot clinker. Despite the higher rate of burning, it is not possible for clinkers to form, because the small size of the fire bed permits the water surrounding the tube to carry off the heat so rapidly that the actual temperature of the burning coal is lower than the point at which clinkers form in an anthracite fire.

"As the development thus represents a principle of combustion rather than of equipment design, the flexibility of application is unlimited. This principle may be employed in the design of equipment for



**A standard heater (right) of the size now used in coal-heated homes contrasted with the water-jacketed tube that will perform the same functions in post-war equipment designed to take advantage of the new principle of burning anthracite.**




**Showing diagrammatically how the new coal-burning unit functions.**

EXAMPLE OF *Service*:

A prominent St. Louis contractor writes:
"We have been using your products for several years with good results. The first of this year we also began using your oils in our trucks and Caterpillar tractors and we believe Cities Service lubricants are the best we have ever used in our equipment . . ."

**More and more, it's service that counts . . .**

**and *Cities Service* means good service!**

CITIES SERVICE OILS
ONCE-ALWAYS
CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY

large or small homes, central heating units or space heaters, hand-fired or fully automatic furnaces. Regardless of the forms which the various applications take, however, they will have the universal advantages of extreme simplicity, high efficiency and unprecedented compactness.

"In adaptation to fully automatic equipment, the anthracite is fed into the tube by a conveyor leading directly from the coal supply. The ash is discharged into inclosed dustproof containers, which would need to be replaced only two or three times a week, or directly into pits prepared for the purpose outside the basement. The amount of heat desired is regulated automatically by thermostatic control."

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## Mine Fatalities Still Below Last Year's

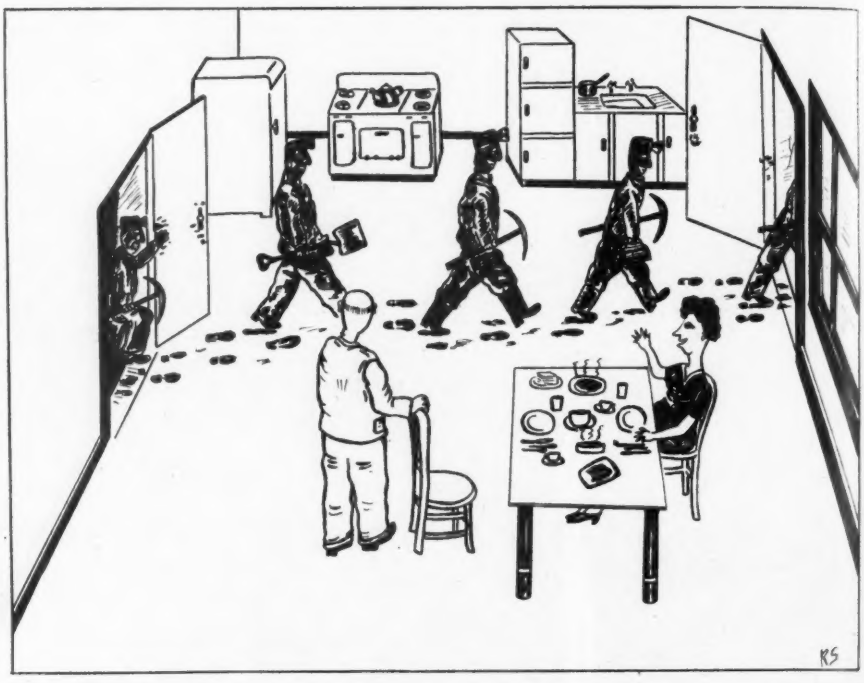
Accidents at coal mines of the United States caused the deaths 79 bituminous and 10 anthracite miners in June last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 53,395,000 net tons, the accident death rate among bituminous miners in June last was 1.48 per million tons, compared with 1.39 in the preceding month and 2.33 in June, 1943.

The anthracite fatality rate from accidents in June last was 1.78, based on an output of 5,618,000 tons, against 2.40 in the preceding month and 4.32 in the sixth month of the 1943.

For the two industries combined, the accident fatality rate in June last was 1.51, compared with 1.24 in the preceding month and 2.50 in June a year earlier.

Fatalities during June last, by causes and states, as well as comparable rates for the first six months of 1943 and 1944, were as follows:



"George, dear, don't you think they're getting a little close with the coal mine?"

**U. S. COAL-MINE FATALITIES IN JUNE, 1944, BY CAUSES AND STATES**

| State | Underground: Falls of Roof | Falls of Face | Haulage | Gas or Dust Explosions | Explosives | Electricity | Mine Fires | Other Causes | Total Underground | Open-cut | Surface | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 3 | .. | .. | .. | .. | .. | .. | .. | 3 | .. | 1 | 4 |
| Arkansas | .. | .. | .. | 3 | .. | .. | .. | .. | 3 | .. | .. | 3 |
| Illinois | 2 | .. | 5 | .. | .. | .. | .. | .. | 7 | .. | .. | 7 |
| Indiana | 2 | .. | 1 | .. | .. | .. | .. | .. | 3 | .. | .. | 3 |
| Kentucky | 8 | .. | 3 | .. | .. | 1 | .. | 1 | 13 | 1 | 1 | 15 |
| Maryland | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 2 |
| Ohio | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 2 |
| Pennsylvania (bituminous) | 9 | .. | 5 | .. | .. | .. | 6 | .. | 20 | 1 | 1 | 22 |
| Tennessee | 2 | .. | 1 | .. | .. | .. | .. | .. | 3 | .. | .. | 3 |
| Virginia | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 |
| West Virginia | 8 | .. | 5 | .. | .. | .. | .. | .. | 13 | 1 | 2 | 16 |
| Wyoming | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 |
| Total bituminous | 38 | .. | 20 | 3 | .. | 1 | 6 | 1 | 69 | 4 | 6 | 79 |
| Pennsylvania (anthracite) | 3 | 1 | 3 | .. | 1 | .. | .. | 2 | 10 | .. | .. | 10 |
| Grand total | 41 | 1 | 23 | 3 | 1 | 1 | 6 | 3 | 79 | 4 | 6 | 89 |

**DEATHS AND FATALITY RATES AT U. S. COALS MINES, BY CAUSES OF ACCIDENTS ***

January-June, 1943 and 1944

| Cause | Bituminous: Number Killed | | Bituminous: Killed per Million Tons | | Anthracite: Number Killed | | Anthracite: Killed per Million Tons | | Total: Number Killed | | Total: Killed per Million Tons | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Underground: | 1943 | 1944 | 1943 | 1944 | 1943 | 1944 | 1943 | 1944 | 1943 | 1944 | 1943 | 1944 |
| Falls of roof and coal | 330 | 263 | 1.162 | 0.824 | 49 | 43 | 1.671 | 1.298 | 379 | 306 | 1.209 | 0.869 |
| Haulage | 123 | 110 | .433 | .345 | 18 | 13 | .614 | .392 | 141 | 123 | .450 | .349 |
| Gas or dust explosions: | | | | | | | | | | | | |
| Local | 18 | 6 | .063 | .019 | 1 | 1 | .034 | .030 | 19 | 7 | .061 | .020 |
| Major | 96 | 16 | .338 | .050 | ... | ... | .... | .... | 96 | 16 | .306 | .045 |
| Explosives | 16 | 4 | .056 | .013 | 5 | 9 | .170 | .272 | 21 | 13 | .067 | .037 |
| Electricity | 20 | 15 | .071 | .047 | ... | 1 | .... | .030 | 20 | 16 | .064 | .046 |
| Machinery | 11 | 17 | .039 | .053 | 1 | ... | .034 | .... | 12 | 17 | .038 | .048 |
| Shaft | 6 | 3 | .021 | .009 | ... | 2 | .... | .060 | 6 | 5 | .019 | .014 |
| Miscellaneous | 21 | 16 | .074 | .050 | 9 | 8 | .307 | .241 | 30 | 24 | .096 | .068 |
| Stripping or open-cut | 16 | 13 | .056 | .041 | ... | 2 | .273 | .060 | 24 | 15 | .077 | .043 |
| Surface | 31 | 23 | .109 | .072 | 10 | 6 | .341 | .181 | 41 | 29 | .131 | .082 |
| Total | 688 | 486 | 2.422 | 1.523 | 101 | 85 | 3.444 | 2.564 | 789 | 571 | 2.518 | 1.621 |

* All figures subject to revision.

## Harman Plans Mine

J. E. Biggs Jr., president, Harman Coal Corp., operating at Harmon, Va., has announced plans for construction of what it is asserted will be the largest operation in Pike County, Kentucky, 40 miles east of Pikeville, with tipple at Turkey Pen, on Big Creek, to take coal from leases said to contain 52,000,000 tons.

The new operation, which is planned as a long-range project, equipped for cleaning and sizing all grades of coal, is expected to be ready to ship in May or June of 1945. The Norfolk & Western Ry. is building a 9-mile extension down the Levisa River to a terminal at Nigh, Ky., from which will extend a 3-mile spur to the new tipple at Big Creek.

•

## National War Fund

National War Fund—federation of war philanthropies—is to launch a charity drive Oct. 1, which will continue until Nov. 30, to obtain funds for support of U.S.O. and related services extending to 91 countries and geographic areas on six continents. The Fund is served by 4,000,000 volunteer workers in cities, towns and hamlets throughout the nation. Working through 48 State organizations in direct contact with the national office, the yearly appeal is carried on by 10,000 committees, including community chests, county committees and State war chests.

To carry out its aims, having the one objective—to help win the war sooner, with a minimum loss of life—the Fund heads up 19 war-related agencies serving our own fighting men and our allies—such as the U.S.O., United Seamen's Service, War Prisoners' Aid, United China Relief, Russian War Relief and others.

# LOMBARD PUMPS NEW LIFE TO CALIFORNIA BADLANDS

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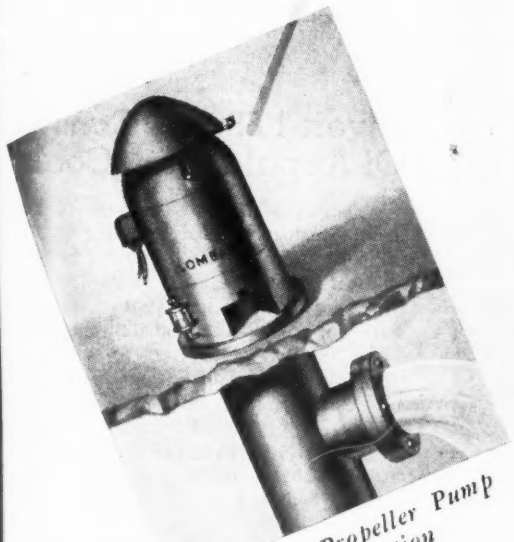
21,600,000 gallons of precious water per day is the capacity of Lombard's giant pumps, designed to reclaim thousands of acres of arid western land for the farmers of the future.

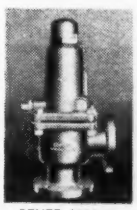
But whether it's 15 or 15,000 G. P. M.; whether it's a vertical, close-coupled or submersible pump; Lombard's 50 years of applied experience and world-wide acclaim for her craftsmanship are the guarantee of durable, economical and trouble-free performance.

Also serving the nation's war machine, agriculture, shipping and industry are Lombard's famed Water Wheel Governors, Variable Speed Drive, Relief Valves and other hydraulic control units.

In War and in Peace, Lombard's advanced hydraulic and engineering skill continues to enhance her leadership in these fields. Our staff of specialists is at your service.



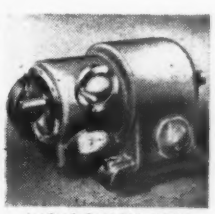
*Lombard Propeller Pump for Irrigation*



RELIEF VALVE

CENTRIFUGAL PUMP

WATER WHEEL GOVERNOR



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# GENUINE FLEXIPIPE VENTILATION

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Moreover, with *Flexipipe* ventilation, the men spend a greater proportion of their time working productively because, since smoke and fumes are carried away quicker, they lose less time after every blast.

Still another production advantage in using *Genuine Flexipipe*—it's long-lasting because it's sturdily made of tough, specially woven fabric that's specially treated to resist damage from gas, fungus growth, heat, acid and alkaline waters. It's compact, lightweight, easy to handle, economical. And if it should be torn or cut, you can repair it easily.

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## Fies Opens Practice As Consultant

Milton H. Fies, vice president in charge of operations of the DeBardeleben Coal Corp., Birmingham, Ala., with which he has been associated for 32 years, has resigned from that post as of Sept. 1 to establish offices as a consulting engineer in the First National Bank Building, Birmingham. Associated with him will be engineers specializing in civil, mechanical, chemical and industrial engineering.

In announcing the resignation of Mr. Fies, Henry T. DeBardeleben, president of the company bearing his name, said that Mr. Fies would act as consulting engineer for the company. He is serving in like capacity for the Alabama Power Co. and for the electro-technical laboratory of the U. S. Bureau of Mines. He is trustee and treasurer of the Southern Research Institute and is chairman of Alabama District No. 2 of the Committee for Economic Development.

Prior to this connection with the DeBardeleben interests he was with the Republic Steel Corp. and the Birmingham Coal & Iron Co.

•

## Meetings Set For Anthracite Group

Wilkes-Barre, Pottsville and Hazelton have been selected as the localities for the three meetings of the Pennsylvania Anthracite Section of the American Institute of Mining and Metallurgical Engineers to be held during the coming year.

Edward Griffith, vice president and general manager, Glen Alden Coal Co., will be chairman of arrangements for the Wilkes-Barre meeting, which will be held some time during November.

William B. Wells, mining engineer and estate agent, will be chairman of arrangements for the Pottsville meeting, to be held some time in May.

Robert L. Klotz, district manager, Hercules Powder Co., will be chairman of arrangements for the Hazleton meeting, which will be held in July next.

•

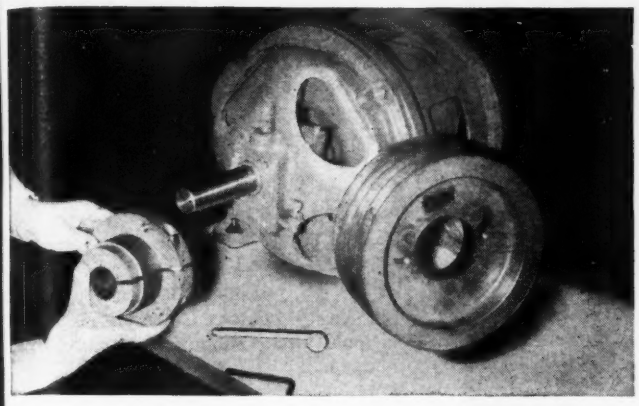
## Divert 1,680,000 Tons Of Appalachian Coals

Because of an acute shortage of high-grade Appalachian coals, suitable for making coke and by-products, Acting Secretary of the Interior Abe Fortas stated Aug. 25, the Solid Fuels Administration for War was to begin immediately diverting 1,680,000 tons of the fuel to steel plants from industrial plants using it for generating steam. The diversion, which will force many industries to turn to strip-mined or to lower-quality deep-mined coals, are to be made at a rate of about 420,000 tons per month during the next four months.

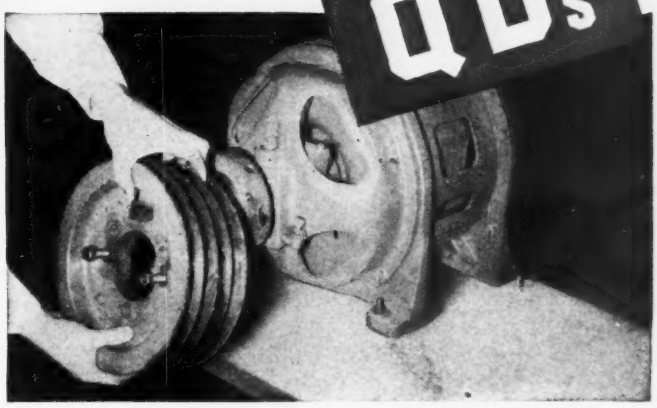
"This drastic step must be taken in order to protect wartime steel production," said Mr. Fortas. "The coal is urgently needed to build back up to safe levels depleted stockpiles of coal at coke and byproduct plants."

# DO YOU HAVE THESE 3 FEATURES IN YOUR PRESENT SHEAVES?

*If so, they must be* WORTHINGTON'S **QDs**



**1. EASY TO GET ON**



**2. EASY TO GET OFF**

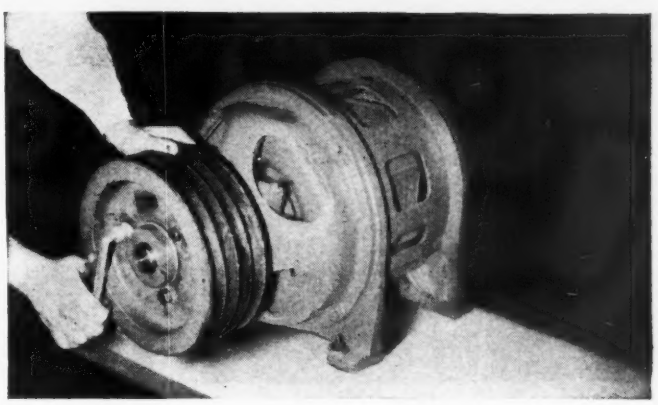
Are you losing time with old-fashioned sheaves? You may be, if you haven't got the QD's time-saving *three* features.

**1.** Split hub — with taper cone surface for mounting taper bored rim — makes *installation easy*.

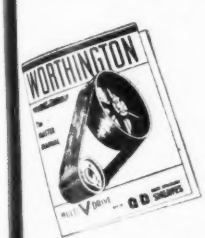
**2.** Pull-up screws usable as jack bolts break Taper Friction Fit, quickly free shaft for bearing maintenance, speed changes, or *quick removal* and mounting of different diameter rims . . . without disturbing the hub. No alignment problems.

**3.** Bigger pull-up bolts for higher taper cone pressure insure positive clamp grip, keep sheave *always tight on the shaft*.

The sheave with these 3 features, teamed up with Worthington Goodyear Endless Cord V-Belts will give you more for your money. Stock size sheaves and belts at strategic centers from coast to coast.



**3. YET ALWAYS TIGHT ON THE SHAFT**




## *Reading Time: 3 Minutes*—To Get Accurate Belt Ratings

From the 72-page Master Manual, containing original engineering data . . . sectionalized, loose-leaf, tabbed for ready reference . . . you can select in three minutes the right Worthington V-Belt drive. You get accurate belt ratings . . . avoiding *over*-belting and *under*-belting. Send the coupon today for your free copy! Specification and installation record sheets included.

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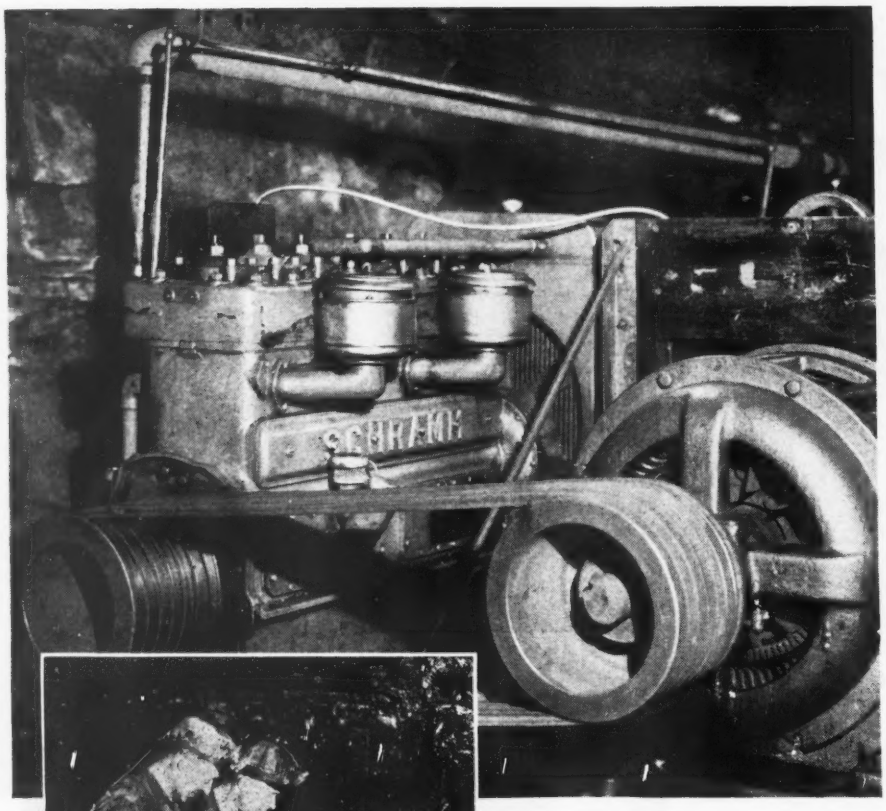


# Doing a GREAT Compressed Air Job

Deep in this Jessup, Pa., Coal Mine . . . you find a Schramm Air Compressor furnishing air for a rock drill to get the coal quicker and easier!

Schramm Air Compressors give you all the air you need . . . anywhere you want it in the mine.

You get these features: 100% watercooled to prevent overheating or freezing . . . mechanical intake valve operating from cam in perfect timing . . . larger discharge valve with lower lift adding to efficiency . . . furnished either for belt drive or "built-in" motor drive, assembled rigidly and in perfect alignment. For full details write today.

SCHRAMM INC. THE COMPRESSOR PEOPLE WEST CHESTER PENNSYLVANIA

## Rush Development At Seven Point Mine

Development under way at Seven Point mine, Phippsburg, Routt County, Colo., leased by Samuel Pursglove from Marion Posig, includes construction of a tipple capable of loading 500 tons of coal in eight hours, a dry separation plant, and three more large bulldozers and 14-cu.yd. scrapers on stripping operations. A shovel is to be brought in soon to load coal on the fleet of trucks to operate between the separator and tipple.

•

## Ayrshire Buys Republic Stock

Albert M. Campbell, executive vice president, Ayrshire Patoka Collieries Corp., Indianapolis, Ind., announced Aug. 18 that arrangements had been made for acquisition of the common stock of the Republic Coal & Coke Co., Chicago. It was stated, however, that Republic would continue to operate exclusively as an independent sales organization and that Lyle H. Dayhoff and Harold D. Wright, co-founders of Republic, would continue as chairman of the board and president, respectively.

Ayrshire Patoka was incorporated in 1939 as a consolidation of Electric Shovel Coal Corp. and Patoka Coal Co.

•

## Proposes Joint Spur In West Kentucky

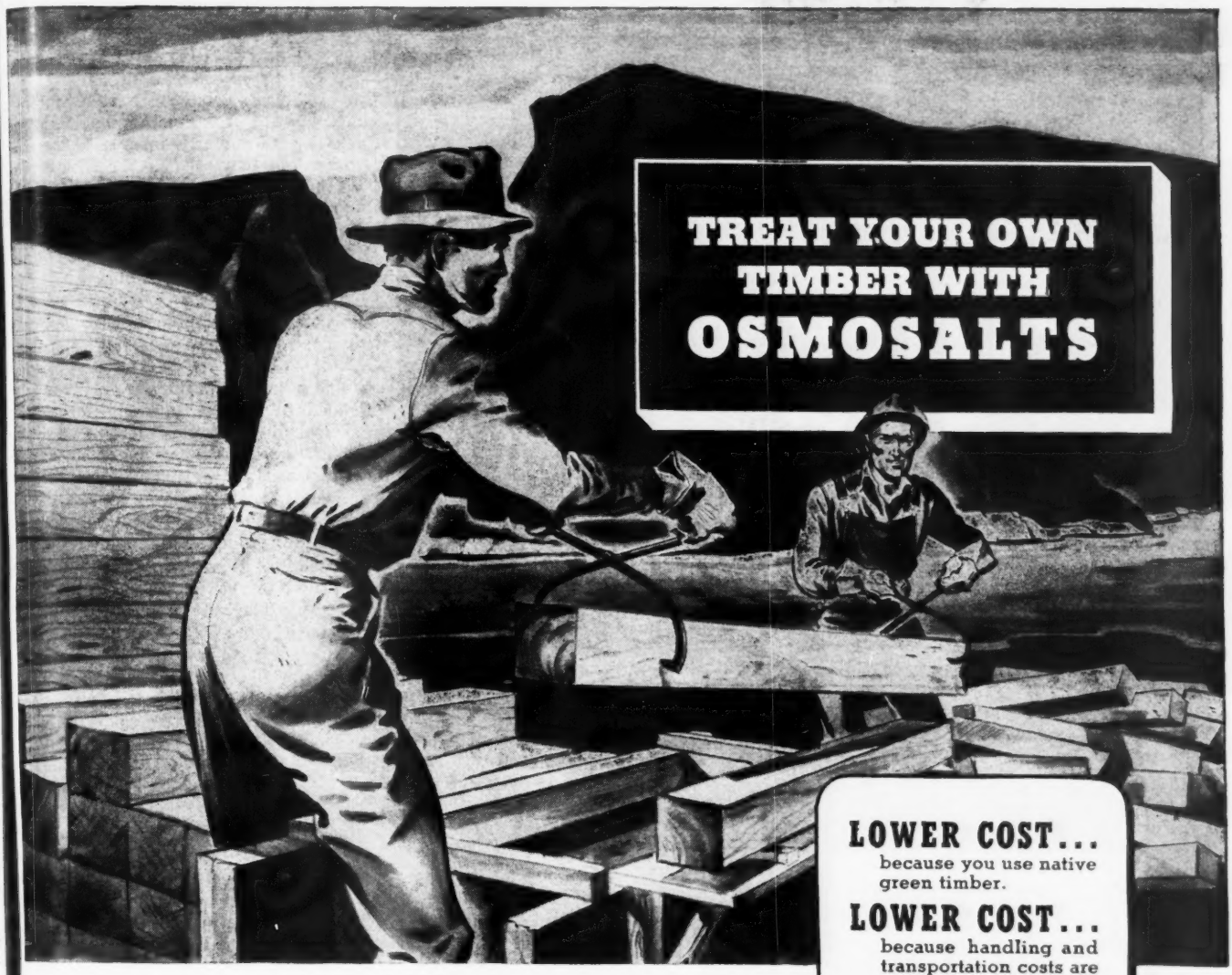
Speaking July 29 at an Interstate Commerce Commission hearing at the Kentucky Hotel, Louisville, R. E. Barr, vice president, Illinois Central R. R., proposed that the Commission authorize the I.C. and the Louisville & Nashville R. R. jointly to build, own and operate a new spur track into new coal fields in Muhlenberg County, western Kentucky.

The L. & N. seeks permission to extend a spur two miles east into the new field from its tracks running south from Central City to haul coal from the Wickliffe and Kirk coal company mines. The I.C. desires to build a seven-mile spur southwest into the same field from its tracks running east from Central City. L. & N. opposed extension of I.C. tracks whereupon I.C. proposed the cooperative scheme.

•

## Colliery Assets Sold

Remaining assets of the Colonial Colliery Co., Mt. Carmel, Pa., have been purchased by Attorney Matthew D. Mackie for $210,000 from John Askinski, vice president of District 9, United Mine Workers, acting as trustee for a Philadelphia bank holding bonds in the company. Included in the sale was a modern coal-cleaning plant, considerable mining machinery and 89 homes at Natalie. For many years Colonial Colliery was the banner property of Madeira, Hill & Co., Philadelphia.




**LOWER COST...**
because you use native green timber.

**LOWER COST...**
because handling and transportation costs are greatly reduced.

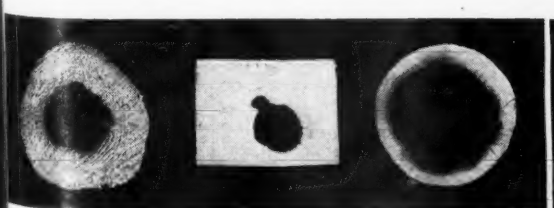
**LOWER COST...**
because no special, expensive equipment is needed.

**LOWER COST...**
because it can be applied with any unskilled labor.

More than one mine has solved their timber decay problem by natural-pressure treating their own timbers with OSMOSALTS.

In so doing, they have not only been able to considerably reduce their over-all timber costs, but have provided a dry, clean, odorless treated timber which is safe to handle and fire retardant as well.

Taking such a step involves practically no expense in equipment and requires only ordinary labor for the work. In many cases, the timber supply exists on the property. We have a bulletin which gives the facts—application, equipment needed, and costs. It explains how you can save, preserve and protect with OSMOSALTS. Send for it today.



Illustrated above are cross sections of three kinds of timbers. The white outer areas, which have been subjected to standard color reagent tests, show the deep penetration of the toxic salts in Osmoplastic.

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*Nature's Method of Wood Preservation*

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OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

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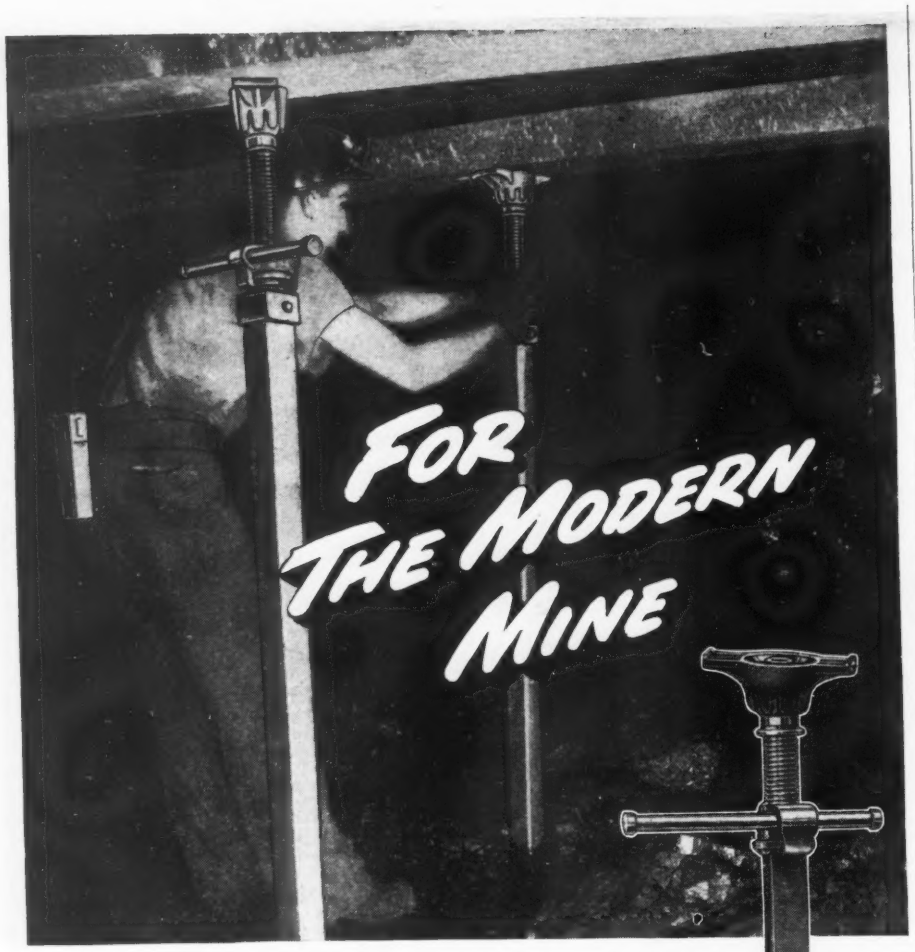


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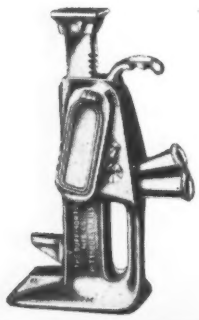
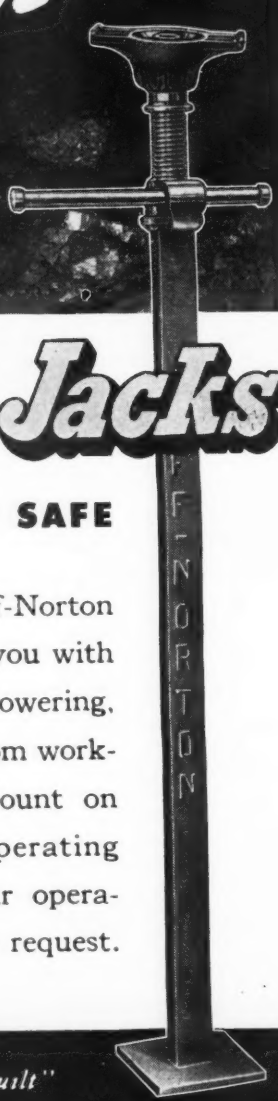
A wide variety of Duff-Norton Jacks is ready to help you with your heavy lifting, lowering, pushing and pulling, from working face to tipple. Count on these sturdy, easy-operating Jacks for help in your operations. Catalog 202 on request.



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## Will Erect 2 Plants To Treat Utah Coals

Two plants are to be erected and operated for the carbonization of Utah coals late in 1944 and early in 1945. The work, to be done by Coal Logs Co., Inc., in cooperation with the Utah Department of Publicity and Industrial Development, contemplates (1) a 50-tons-per-day semi-commercial plant to manufacture primary tar oils and low-temperature Coal Logs, and (2) a 100-lb.-per-hour model of the foregoing unit combined with apparatus designed to produce metallurgical coke in addition.

With the 50-tons-per-day plant it is intended to produce low-temperature coke or Coal Logs in carload lots for shipment to iron and steel plants for blending with coking coals in the manufacture of blast-furnace coke of improved strength. The plant also is to produce 30 bbl. per day of tar oil. One of the refined products of coal tar, it is pointed out, is cresylic acid, used extensively by the metal-mining industry. The yield from Utah byproduct coal tar is about 3 percent of the total tar, or about 0.4 gal. per ton of coal treated. Studies at the University of Utah on tar oils show that a commercial yield of 30 percent cresylic acid may be anticipated, or about 7.5 gal. per ton of coal treated.

Thus, according to sponsors of the project, tar oils offer the possibility of making almost 20 times the quantity of cresylic acid now made from every ton of Utah coal. So far as known today, sponsors of the project say, this is the outstanding feature that makes tar oil more valuable than byproduct tar. Other important uses that it is said may result from the project are: (a) production of 100-octane gasoline by thermal cracking of tar oil in existing oil-refining equipment (previous studies at the University of Utah have produced such gasoline in laboratory quantities); (b) production of a host of products such as creosote, pitch, pitch coke and bases for plastics and paints.

The feasibility of turning out the foregoing products of the desired quality and at a satisfactory cost is to be determined primarily in such Utah plants as the Republic Creosoting Co., Utah Oil Refining Co. and Wasatch Oil Co.

Production of crude tar oils by the 50-tons-per-day plant is estimated at a minimum of 375,000 gal. annually, from which 100,000 to 125,000 gal. of cresylic acid and 80,000 gal. of 100-octane gasoline may be produced. The foregoing, however, represents only what it is hoped to accomplish with respect to tar oils. These hopes are based on at least 15 years of study by many investigators, it is pointed out, and therefore have a sound foundation. Therefore should even one of the probabilities prove feasible both technically and economically, research again will have pointed the way toward development of worth-while ideas contributing to the war effort.

With the 100-lb.-per-hour plant at the University of Utah it is expected to produce metallurgical coke and electrode carbons from non-coking Utah coals, opportunity for which has been definite

# WOOD *Specialization*

## ASSURES MORE WEAR *in the* BLADE

**For over 40 years, WOOD has specialized exclusively in making Shovels, Spades and Scoops of finest quality.**

**THE STEEL I-BEAM HANDLE REINFORCEMENT**

...a result of WOOD SPECIALIZATION... found only in Products made by WOOD. Adds 30%, and more, strength where 65% of breaks occur.

The exceptional strength, toughness and long-wearing durability found in BIG FIST Coal Shovels, are examples of the extra values created by WOOD Specialized Manufacture.

BIG FIST blades are made of Special Analysis Alloy Steel . . . Precision Tempered for toughness . . . Brinell Tested for hardness and supreme wear-resistance.

**BIG FIST BRAND SHOVELS ARE TOP FAVORITES IN THE COAL MINES OF AMERICA.**

*The BIG FIST Closed Back Coal Shovel . . . with Steel I-Beam Handle Reinforcement.*

**ESPECIALLY DESIGNED TO MEET REQUIREMENTS OF EXPERIENCED COAL MINERS.**

BIG FIST Brand Shovels, Spades and Scoops are normally available in all types, styles, weights and sizes required in the mining of coal.

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**The WOOD SHOVEL AND TOOL COMPANY**

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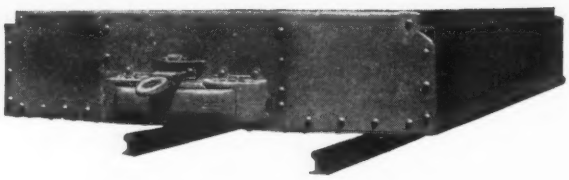
# Dependable MINE CARS

Steelcar

TO MEET YOUR SPECIFIC OPERATIONS



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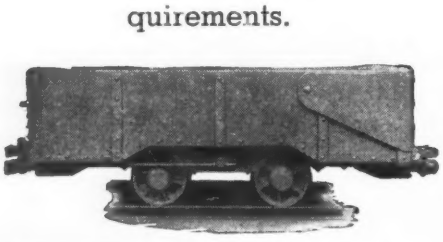
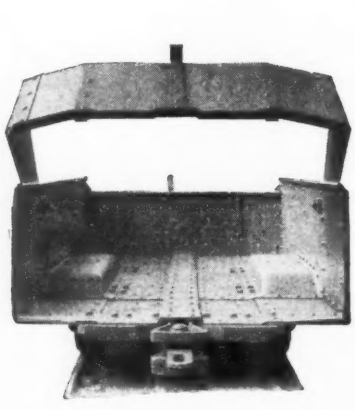


*Full data and descriptive brochure gladly sent on request.*



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PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
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indicated by preliminary research. Further research now is planned as an integral part of the program to make all standard tests of the product to determine its properties for use in blast furnaces and foundries. As few, if any, of the western coals produce a first-class coke, it is pointed out, the need for improved and cheaper metallurgical coke is apparent.

In connection with the making of electrode carbon, it is intended to combine the Coal Logs process with that of Dr. Adrian Nagelvoort, of Huntington, Utah.

Scheduled for 1945 is the construction and operation of a large coal-processing plant to produce essential items shown by experience to be feasible to manufacture. In this plant, which is to have 1,000 tons per day capacity of raw coal, it is intended to incorporate the findings from the smaller plants to produce large quantities of war-important materials economically. Other benefits expected of the large-scale plant include (a) judicious use of the important natural resource—coal, (b) production of synthetic liquid fuels in conformity with the Bureau of Mines' anticipated program, and (c) providing postwar employment.

•

## Pittsburgh Coal Buys Clover Splint Stock

President J. B. Morrow of the Pittsburgh Coal Co. announced Aug. 25 the purchase of all capital stock of the Clover Splint Coal Co., of Closplint, Harlan County, Ky. The latter, which has an annual output exceeding 400,000 tons, will be operated as a subsidiary of Pittsburgh Coal Co. Clover Splint company was organized in 1928, producing a premium domestic coal, also used for industrial and coking purposes.

•

## Mine Development Looms in Harlan

Coal development on a scale unequalled since the opening of the Martin's Fork field 20 years ago now looms for Harlan County, Kentucky, where surveys are being made to tap high-grade tracts. The Louisville & Nashville R. R. has mapped plans for extending its tracks 10 miles above Closplint, where development is to bring into operation three to five mines with estimated output of 100 to 150 railroad cars of coal per day. Ten thousand acres of virgin coal land owned by the Stonega Coke & Coal Co. and the Blackwood Land Co., both of Virginia, are to be opened, it is said, by the proposed expansion.

•

## Lake Traffic Soars

With 6,917,938 tons shipped, coal movement up the Great Lakes was the largest ever hauled in the month of July. Cumulative coal shipments from April 1 to July 31 were 27,153,677 tons, compared with 20,048,498 tons for the corresponding period of 1943.

# The *Stake* of the United States in Expanding World Trade

WITH the war in Europe racing to a climax, and with a sure pattern for the defeat of Japan already outlined, American business is confronted with the need for an immediate decision on long-term economic policy.

What is this country's foreign trade program to be after the war?

No intelligent appraisal of all the factors any longer can allow us to postpone considering the issue merely because, in the past, foreign trade absorbed barely eight per cent of our production.

Actually, a whole new set of conditions was injected into the picture by the first World War; but we persisted in ignoring these new factors.

Almost overnight, the United States was transformed from the largest debtor nation in the world to the second largest creditor nation. At the same time, we made faster technological progress than any other nation. Thus we created the need for more dollar exchange on the part of the rest of the world and simultaneously made it harder for other nations to earn dollars.

Today, as another, far vaster war is approaching its end, those changed circumstances are magnified. America has new responsibilities—to itself, and to the world.

Our war-inflated industrial capacity cannot be allowed to drop back to prewar levels without causing a domestic crisis which we dare not permit.

And, because so much of the world is geared to the American industrial machine, we can no longer contemplate calmly the repercussions of a largely self-sufficient trade program or of an unplanned foreign trade program. Either would inevitably set the stage for the next world war.

☆ ☆ ☆

If we are going to prepare ourselves intelligently to cope with this new problem, we must acknowledge certain basic principles.

World trade cannot be rebuilt simply by attempting to restore *prewar* flows of goods. The war has so completely changed the economic fiber of many countries that it is necessary to develop *new* trade relationships. The East Indies, for example, may find the demand for their rubber considerably reduced; the United States may, to a large extent, have to cease exporting cotton; Japan will need to find new substitutes for much of its exports of silk; the British will need new markets to replace the income which they formerly derived from their large overseas investments.

We cannot expand markets for our goods, at home or abroad, unless we find ways of buying more supplies from more people at home or abroad, so that they will have more dollars to spend.

And we probably cannot create increasing buying power abroad without first exporting more of our technical skills—our engineers, our production and management men—to build new markets for our own specialties.

☆ ☆ ☆

What is needed to rebuild the world's economic system?

1. Most basic of all, of course, are stable governments which command popular support. In the absence of strong governments, currency stability cannot be achieved.

2. Most war-stricken countries, for a year or two, will need rehabilitation loans, because they will require far more raw materials, equipment, and live stock than they can pay for out of current production.

3. Loans, however, are only a stop-gap, though often a necessary one. Far more important than rehabilitation loans will be the creation of better opportunities for war-stricken countries to sell to the rest of the world, particularly to the United States, South America, South Africa, and India. The ravages of war do not completely destroy the ability of a country to sell. Indeed, it is surprising what large supplies of certain commodities war-torn countries have on hand even before devastated industries have been restored. The invading troops in Normandy found shoes almost non-existent, but they found food more plentiful than in Britain.

   Better opportunities for war-stricken countries to sell would create opportunities for them to buy the things they will require to restore scattered industries and depleted farms, and would help those countries to get rid of the exchange controls which are now universal. So long as a country is able to expand its exports only slowly and painfully, and is dependent upon foreign loans to prevent the depreciation of its currency, so long will it carefully preserve exchange controls and other restrictions in imports. That is why large advances, either through an International Monetary Fund or an International Investment Bank, can make only limited contribution to the removal of trade restrictions.

4. Permanent monetary and credit arrangements are needed to protect nations against temporary pressure upon their currencies, to permit necessary changes in exchange rates to be made in an orderly manner, and to assure that governments never again will repeat the "beggar-my-neighbor" policies of 1931 and 1932.

5. Finally, the world needs a reversal of the trend toward economic self-sufficiency, which received a strong impetus from the first World War and an even stronger one from the great depression of the Thirties. This does not mean that the efforts of many raw-material producing countries to diversify their industries should be opposed. During the late Nineteenth Century and the first part of

this century, the international specialization of production was carried too far, with the result that many countries became dependent for a large part of their standard of living upon the export of one or two raw materials—coffee, sugar, rubber, silk, wheat, wool, and meat. Between the two World Wars, however, the pendulum swung much too far in the direction of self-sufficiency. Some densely populated industrial countries of Europe (Italy, France, and Germany) even attempted to become self-sufficient in wheat, fats, and sugar. So limited are the natural resources and technical skills of most countries that each one finds many things which it can produce only at prohibitive costs. Between the extreme specialization of the late Nineteenth Century and the more recent trend toward extreme self-sufficiency, a happy medium should be sought.

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What role should the United States play in reconstructing the world's international economic system?

There are those who suggest that the United States be a more or less permanent Santa Claus. They believe that an excess of exports could be financed only by "loans"—loans that would eventually turn into gifts, after producing bitter controversy over why the "debtor" country did not meet its obligations. The persons who assert that full employment can be provided only by an excess of exports are in effect saying that our economy cannot become self-supporting. That is a confession of economic defeatism which a young and vigorous nation should not be willing to make.

*The most immediate contribution which the United States can make to world reconstruction is to make itself prosperous.*

Prosperity here means a large demand by our industries for imports. The more we import, the easier will it be for foreign countries to meet their large and urgent needs for goods. In 1939, with a gross national product of $100 billion, our imports were $3 billion. After the war, with 55 million people employed and a gross national product of $155 billion, our imports would be about $7 billion or $8 billion.

Not only should the United States make itself prosperous, but it should *keep* itself prosperous. *So important is the United States in the world economy that a depression here is bound to produce a disastrous drop in the price of raw materials throughout the world and to throw most countries into an economic tailspin.*

The United States should support the principle of a large fund to protect the exchanges of the world from temporary pressure. We should not permit differences over the details to prevent its establishment in ample time to be available during the critical period when war-stricken countries will need goods far in excess of their immediate ability to pay for them. *Some* arrangement, even though imperfect in details, will be infinitely superior to no arrangement.

Finally, the United States should take the lead in breaking down barriers to trade. We are the logical country to do this, partly because of our immense domestic market, and partly because for most of the last twenty-five years this country has been able to sell other countries more goods than they have been able to sell to us. One of the greatest contributions which the United States could make to a sound and expanding world economy would be to bring our imports, as soon as practicable, up to our exports. *In other words, the United States, in the long run, should be hard to borrow from but easy to sell to.* The United States should implement this policy (1) by continuing the negotiation of reciprocal reductions in duty, and (2) by accepting exchange rates which make foreign currencies cheaper in dollars than they were in 1939. So great will be the world's need for goods that we can be sure that any dollar exchange earned by sales to us will be converted into American-made goods and will lead to larger exports.

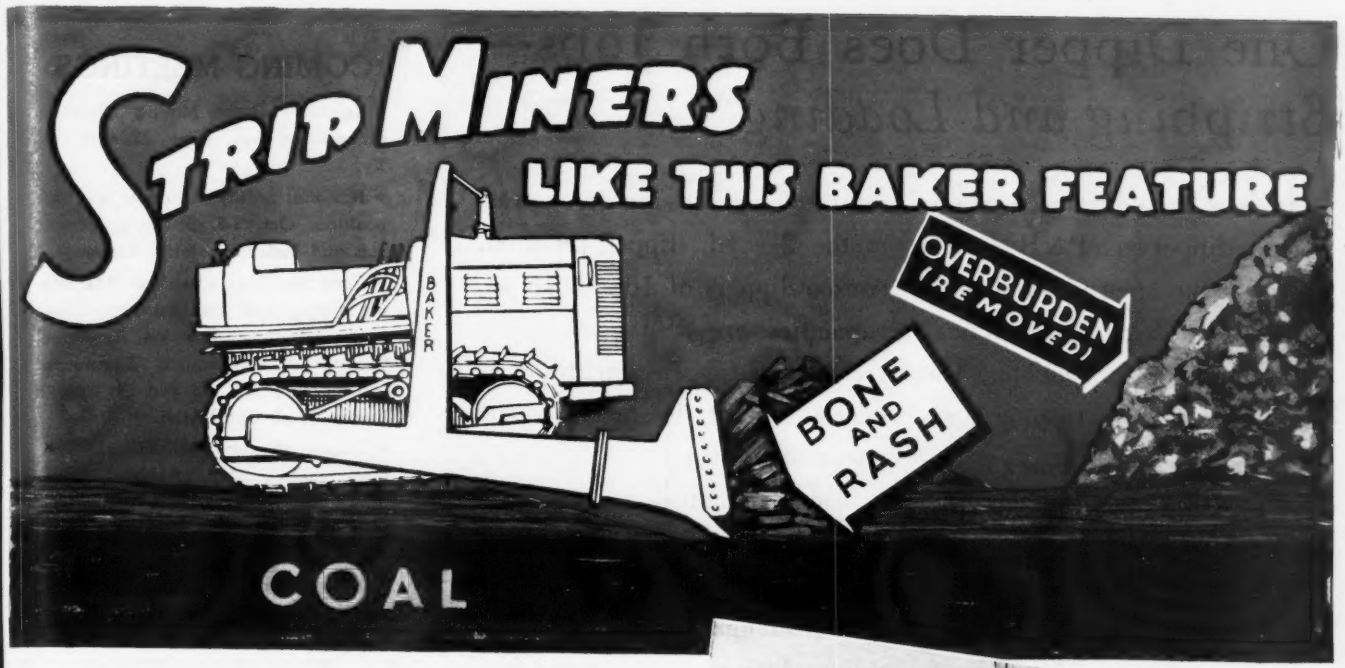
Time was when the United States obtained about eight per cent of its standard of living by sending goods abroad and bringing back other goods. Before the war, however, we were getting less than five per cent of our living by international trade. If, after the war, we were gradually to raise the proportion of our standard of living obtained by trading with other countries to ten per cent of domestic production, our imports would be about $15 billion or $16 billion a year. Our people would be able to buy many things which they now cannot afford, and scores of countries which export raw materials and luxury products would feel the stimulus of rapidly expanding markets. Their expanded demand for road building machinery, mining machinery, machine tools, agricultural implements, locomotives, railroad cars, electrical equipment, trucks, automobiles, and a multitude of products of our factories would create a million or more additional jobs in our factories.

Although the United States would raise its standard of living by increasing its imports and its exports, it should honestly face the fact that the resulting shifts in production and employment would temporarily be painful for some people. The increase in imports would be in commodities which other countries can produce for less than the cost at which much of our output is produced—such as sugar, wool, copper, some fats and oils, wines, winter vegetables and fruits. The increase in our exports would come from those industries in which our superiority is greatest—particularly the manufacturing industries. Finally it would be advantageous, to the country as a whole, to shift a million or two workers from agriculture, where they earn about 60 cents an hour at best, to manufacturing, where they earn better than 80 cents an hour.

☆ ☆ ☆

The very fact that in economic matters the rest of the world is dependent upon the United States, exposes our country to great demands and to envy and misunderstanding. The United States must be willing to help the rest of the world, but its help should take the form of assisting other countries to help themselves. Never in all history has one country had such an opportunity to give the world a rising standard of living, to foster conditions under which peace flourishes. What greater tragedy could there be than to make the sacrifices which we are now making and fail to seize this chance to create a world of hope and opportunity in which the spirit of goodwill among nations is able to flourish.

*President McGraw-Hill Publishing Company, Inc.*




Baker bulldozers and gradebuilders excel at stripping overburden, but when you get down to the tough slate over the seam that's when they really count.

The Baker's direct hydraulic lift and full down pressure on the blade enables it to hog out bone and rash. The blade does not ride along on the smooth, hard surface—it is forced into the overlay. Beside the weight of the blade, *the entire weight of the tractor front can be brought to bear on the blade.*

Bakers uncover coal faster, cleaner and more economically—that's why so many strip miners prefer them. They build mine roads and ramps, help load stripping and coal loading shovels, level slack, spot coal cars and do scores of other jobs. Ask your Allis-Chalmers Baker dealer about priorities and delivery dates. Send for Catalog 839.

Two of the more than 50 Bakers in the Pittsburgh district. Model 338-A Baker Gradebuilder on an Allis-Chalmers HD-14 diesel tractor stripping for Maraco Coal Co., Imperial, Pa. Model 351 Baker Gradebuilder on Allis-Chalmers HD-14 tractor at Imperial, Pa. mine of William Aloe Coal Company. Over 125 strip mines use Bakers.

**THE BAKER MFG. CO.**
**514 Stanford Ave., Springfield, Illinois**
*"If it concerns Victory, it concerns us!"*

BULLDOZERS SNOW PLOWS **BAKER** ARMY E NAVY CONSTRUCTION EQUIPMENT

# One Dipper Does Both Jobs—
## *Stripping and Loading*

Here is a 2½ yd. Amsco renewable lip dipper on a P & H electric shovel at the open pit coal mine operated by Leroy Bonsness near Columbus, North Dakota. The shovel is used for stripping (supplemented by the bulldozer shown in the background) and is also used for loading coal. Before being acquired by Bonsness, it was used by U. S. Engineers for digging riprap rock for the Fort Peck Dam in Montana.

Amsco manganese steel dippers are playing a substantial part in increasing the output of strip mines to meet wartime demands for more coal. Long service life and a minimum of "time out" for repairs have made them profitable investments even for strip mines of modest size. In contrast to the 2½ yd. dipper pictured, Amsco dippers of 15 and 18 yd. capacities are also establishing records for low cost stripping of overburden at the largest operations of this kind.

The economical performance of Amsco dippers at strip mines proceeds equally from the toughness of manganese steel, its abrasion resistance and advanced dipper design. Any well-made manganese steel bucket is economical, but the renewable lip feature is an obvious factor of superiority.

Ask for Bulletin 641-D on Power Shovel Dippers and Parts, showing all types of the dippers we make.

**Bulletin 941-W describes Amsco Conservation Welding Products.**

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
AMERICAN Brake Shoe COMPANY
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES


## COMING MEETINGS

- **Kentucky River Mining Institute: annual meeting, Sept. 22, Hazard, Ky.**
- **National Safety Congress and Exposition: Oct. 3-5, Sherman, Morrison and LaSalle hotels, Chicago.**
- **Coal Division: American Institute of Mining and Metallurgical Engineers, and Fuels Division, American Society of Mechanical Engineers: fall meeting, Oct. 23 and 24, Daniel Boone Hotel, Charleston, W. Va.**
- **Illinois Mining Institute: 52d annual meeting, Oct. 27, Hotel Abraham Lincoln, Springfield, Ill.**
- **West Virginia Coal Mining Institute: annual meeting, Nov. 24, Daniel Boone Hotel, Charleston, W. Va.**

## Pittston Buys Control Of Clinchfield Corp.

A controlling interest in the Clinchfield Coal Corp., Dante, Va., has been acquired by the Pittston Co. through purchase of nearly 81,000 shares of the former's 135,000 shares of common stock. Clinchfield mined nearly 2,500,000 tons of coal last year in addition to nearly 300,000 tons mined by lessees.

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## Prizes Offered For Flexible Heating

"Flexible heating" is envisaged as protection for home owners against fuel shortages and drastic price increases, being the goal sought in an architectural competition announced by the Bituminous Coal Institute for the most attractive and practical designs permitting heating with any major fuel. War Bonds totaling $4,750 are offered as prizes by the institute in the competition open to architects, engineers, designers and draftsmen "to design the basement of a house in such a way that it shall be most useful, convenient, efficient and attractive." The program of the competition specifies that "the design shall include provision for 'flexible heating'—that is, for use of any major fuel."

The magazine *Architectural Record* is conducting the competition, which is to close Nov. 15. Kenneth K. Stowell, a member of the American Institute of Architects and editor of the publication, is serving as professional adviser. Following the judging, winning designs will be published, with credit to the designers. These designs will show to builders and prospective house buyers the most practical, useful and ingenious ideas in modern basement planning.

POWDER
NATIONAL
COMPANY

**Not Living On Our Reputation—
But Building It**

# SLIM-ITE HAS PROVED ITS ABILITY TO SAVE SHOVEL HOURS

National Slim-Ite Powder Series (1-2-3) is at work today in 21 strip mines in Pennsylvania . . . 19 strip mines in West Virginia . . . 14 strip mines in Ohio. And to date 54 strip mines have standardized on one of the Slim-Ites either 1, 2, or 3. Widespread use of Slim-Ite indicates its usefulness!

Hard overburden is easily removed by Slim-Ite, with the least loss of shovel hours and the greatest recovery per pound of powder.

WHY? A wide range in speed, in strength and in water resistance.

Also, it is designed to meet any overburden problem irrespective of geological structure.

These Slimites were designed after long study of overburdens occurring over coal measures in all states east of the Mississippi where strip mining is practiced.

SO — for your strip mining, Anthracite or Bituminous,—turn to National Powders. Get your overburden removed easily — economically. Write today for details.

## NATIONAL POWDER COMPANY

ELDRED (McKean County) PENNA.

Manufacturers of High Explosives for All Industrial Purposes

# PUMP PARTS *Replacement Cost* LESS THAN 1/4¢ PER TON...

. . . ON THIS

# MORRIS

## Medium-Duty Dredging Pump

### after pumping 150,000 tons of fine coal

The job was at the inlet of a fine-coal-washer in the St. David, Ill., plant of the United Electric Coal Company. Water supply was limited. That meant a high solids ratio for economical operation. Actually the solids ranged from 34% to 35% by volume, with the particle size minus 1/16". The pump delivers 1200 GPM of this mixture, and handles about 4 times the rated solids output for this size of pump.

After a total delivery of 150,000 tons of coal, the major wearing parts of the pump showed only moderate wear. The parts replacement cost was estimated at less than 1/4c per ton.

**LONG LIFE DUE TO SPECIAL, WEAR-RESISTANT MORRIS "FLINTMETAL"**

Morris "Flintmetal," a special low-chrome alloy with a Brinell hardness around 700, is responsible for the remarkable wearing qualities of this pump. Unmachinable except by grinding, it outlasts gray iron from four to five times, and it is used by Morris in place of today's synthetic rubber linings which are not holding up as well as pre-war gum rubbers.

● Morris Slurry and Dredging Pumps are making remarkable records for efficiency, long wear and low cost in hundreds of applications. Write today for performance tables, specifications, requirements and other data on pumps suited to the particle sizes, densities and volumes of the material you have to handle.

**MORRIS MACHINE WORKS**
**Baldwinsville, N. Y.**
*Sales Offices in Principal Cities*

MORRIS CENTRIFUGAL PUMPS


## Equipment Approvals

**Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:**

**Jeffrey Mfg. Co.—Type 61 conveyor power unit; 25-hp. motor, 220 volts, a.c.; Approval 512; July 13.**

**Joy Mfg. Co.—Type 11BU-10P loading machine; two motors, 50 and 4 hp.; 250 and 500 volts, d.c.; approvals 513 and 513A; July 25.**

**Joy Mfg. Co.—Type PL11-5P elevating conveyor; 7½-hp. motor; 220 and 440 volts, a.c.; approvals 514 and 514A; July 29.**

**Joy Mfg. Co.—Type 42D-12P shuttle car (storage-battery operated); three 7½-hp. motors; 90 volts, d.c.; approval 515; July 31.**

## Denies Jury Trial To Bootleggers

An opinion denying jury trials to two groups of bootleg anthracite miners charged by the Philadelphia & Reading Coal & Iron Co. with contempt of court after allegedly returning to their illicit mining activities while under preliminary injunctions granted by the county court was handed down Aug. 16 by Judge Cummings in the Northumberland County Court at Sunbury, Pa. The two groups included 34 independent workers of the Trevorton area and 45 workers in Coal Township.

The company brought the contempt proceedings preceding a strike of several weeks at all stripping and culm reclamation projects in the Bear Valley, Burnside and Trevorton districts after the two groups of independent miners were made idle under injunction proceedings.

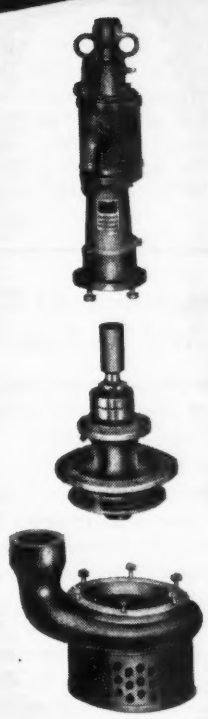
The U. S. Department of Justice intervened by arresting many of the bootleg miners, alleged to have violated the Smith-Connally anti-strike law by influencing workers in legitimate operations to join the independent workers by quitting work. When the accused miners were arraigned in Middle District Federal Court at Williamsport they pleaded *nolo contendere* and were discharged after payment of small fines and placed on probation for specified periods.

An ordinance adopted by the Pottsville (Pa.) City Commission Aug. 5 compels hard-coal stripping contractors working within the city limits to post a bond of $5,000 to $100,000 to assure that strip pits will be refilled when the coal has been removed and to file a map of the stripping project with the City Engineer.

Production of anthracite from bootleg industry in Pennsylvania has declined from 3,900,000 tons in 1942 to 1,912,000 tons in 1943, it is reported. At present about 2,000 men are working in coal holes as compared with a high of 10,700 in 1941, when output is estimated to have been around 5,000,000 tons.

BYRON JACKSON

# Pneumatic Sponge



**BYRON JACKSON PNEUMATIC SPONGE CONSTRUCTION DETAIL**

Impeller is a two-port, non-clogging type, of heat treated Meehanite affixed to a stainless steel shaft, supported by heavy, sealed, grease lubricated, duplex thrust and radial ball bearings. A renewable bronze wear ring, matching the impeller, is inserted within the suction cover.

Volute case, including suction and shaft covers, are of semi-steel. Connector between air motor and pump is of Meehanite and the steel studs, connecting the flanges, are provided with bronze nuts. A perforated steel plate attached to pump below the case serves as a screen to exclude gravel or debris that cannot be passed through pump.

Designed for pumping heads to 150 feet, in single stage, and 300 feet in two stages, the Byron Jackson Pneumatic Sponge finds wide application for use in mine shafts and winzes, coffer dams, cassions, sumps, cisterns, pits, tanks, basements, manholes and bilges; on construction projects, for salvage work or other similar applications where the pumped fluid contains a heavy percentage of solids.

Built either as a single stage unit, or in two stages, for series operation, the Pneumatic Sponge is a centrifugal pump, driven by a rotary air motor, operating on compressed air at pressures from 70 to 100 psi, suitable for operation in any position.

Compact, ruggedly constructed, yet light in weight, the sponge pump is quickly and easily moved from place to place; can be dismantled or converted from individual to parallel or series operation in minimum time and with minimum effort, without the possibility of misalignment.

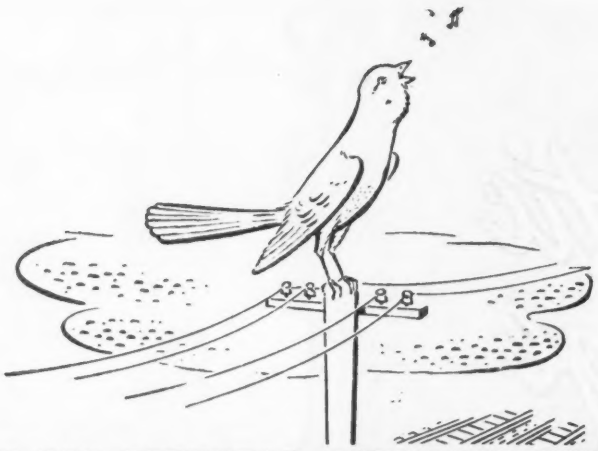
Motor is equipped with a governor and variable speed control, thereby permitting regulation to suit particular conditions of the job.

Two standard sizes are available: 2½" in single or as a two stage unit and a 3" single stage low head unit. Write today for new Sponge Pump Bulletin No. 44-7035. Just off the press.

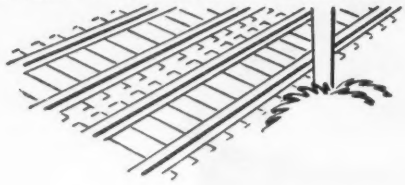
ARMY E NAVY

**BYRON JACKSON CO.**

Houston • Los Angeles • New York



**A NEW GAS DETECTOR OUTMODED THE CANARY AND THERMIT WELDING OUTMODED JOINTED TRACK**



JUST as the miner's canary was replaced by a more scientific gas detector, Thermit welding now modernizes jointed main haulage track by converting it into long stretches of smooth-running continuous rail.

As a result, you have safer operation at higher speeds...less spillage...longer track life...less wear and tear on rolling stock. And maintenance costs are reduced close to 45%.

Another advantage gained through Thermit welding is lower power consumption, as a Thermit welded joint has the same power conductivity as the rail itself.

Thermit welding also is a handy maintenance tool when breakdowns occur in heavy-duty equipment. It will restore broken axles, crankshafts and similar high-tonnage parts to operation with savings in labor, time and costs.

For complete details send for your copy of "Continuous Rail for Main Haulage Track."

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*Specialists in welding for nearly forty years. Manufacturers of Murex Electrodes for arc welding and of Thermit for rail welding.*

## Bill Would Set Up Mo. Valley Authority

A bill to establish a Missouri Valley Authority empowered to create and control the development of resources in the Missouri River area was introduced in the Senate at Washington Aug. 18 by Senator James A. Murray (D.) of Montana. The sponsor of the measure said he believed the project would outstrip the Tennessee Valley Authority, which is the basic model for the proposed M.V.A. undertaking.

The bill calls for a broad program of unified water control and resource development in the Missouri Valley region, including all tributaries and watersheds of the river. Administration would be centered in a federal agency having its headquarters in the region. M.V.A. would be responsible to the President and Congress for carrying out the program outlined in the measure.

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## Edward M. Green Dies

Edward M. Green, general manager, Jermyn-Green Coal Co., Pittston, Pa., which he organized with William S. Jermyn, died Aug. 11 at the University of Pennsylvania Hospital, Philadelphia, after a brief illness. His first affiliation was with the Jermyn Coal Co., where he rose to colliery superintendent, a post he later held with the Pennsylvania Coal Co.

### Magazines for Wounded With No Paper Waste

**In an educational campaign based on a plan for placing in the hands of wounded soldiers and sailors technical and business information that will bring them abreast of engineering and commercial developments, the Cleveland Chapter of the National Advertisers Association is seeking the cooperation of advertising agencies through its committee on technical training rehabilitation. The plan calls for the distribution of thousands of copies of technical, business and trade papers, which will be obtained from the files of advertising agencies—among hospitals and rehabilitation centers housing convalescent wounded veterans.**

**Distribution of these copies now buried in agency files will be in a sense a highly effective paper conservation measure because it will make available to a wider audience at no extra cost in paper the valuable information to be obtained in business publications.**

**The chairman of the committee is John G. Stephan, Stephan National Industrial Advertising Agency, Leader Building, Cleveland, Ohio.**

Our troops inspect a captured Axis tank, looking for booby traps.
INTERNATIONAL NEWS PHOTO

**Every battle** is a showdown . . . our men, weapons and equipment against the enemy's . . . *wire rope* included. That's why our forces need the best rope they can get . . . *and lots of it.* Below are some of the ways in which *you* can help to send more wire rope over there by making your own rope *last longer* over here:

**1. Start** with the correct wire rope. If uncertain about size, grade or construction for your specific job, ask us or any distributor.

**2. Check** equipment thoroughly. Repair or replace worn, corrugated or wobbly sheaves. Line up sheaves with each other and with drums, making sure rope does not rub against flanges. Inspect drums for roundness.

**3. Install** rope carefully. Avoid kinking when unreeling and handling. Never drag rope across concrete or gravel. Wrap rope snugly and evenly on drum, avoiding cross-winding.

**4. Break in** rope cautiously, gradually increasing speeds and loads. And break in the operator, if inexperienced. Instruct him in the importance of smooth starts and stops . . . reasonable loads . . . frequent examination of rope, sockets, clips and splices.

**5. Care** for your rope. Clean and lubricate regularly. On many installations rope can be cut off or shifted to distribute wear. Get better acquainted with ropes by sending for our free Hand Book, "Wire Rope for Mining."

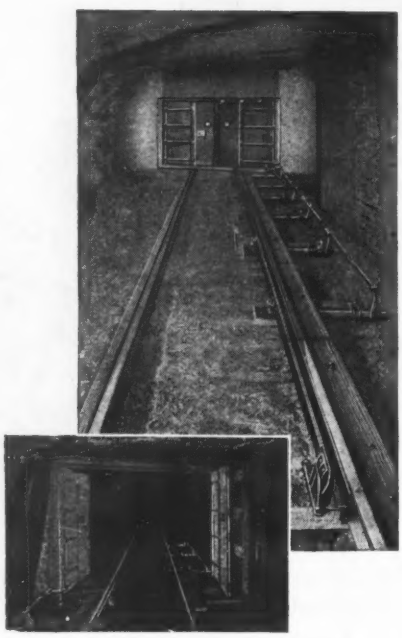
**One thing more:** Use wire rope of known stamina and dependability. *Preformed* Yellow Strand combines flexibility, toughness, elasticity and strength in proper balance. It stays on the job . . . curtails replacements . . . helps you keep manpower and equipment producing . . . for Victory.

**Broderick & Bascom Rope Co., St. Louis**

*Branches*: New York, Chicago, Houston, Portland, Seattle
*Factories*: St. Louis, Seattle, Peoria

# YELLOW STRAND
## *PREFORMED* WIRE ROPE

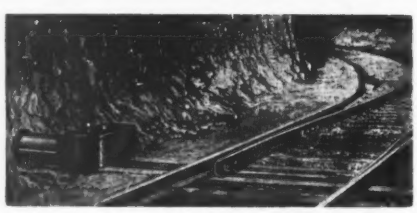
# SAVE LIVES, TIME and MONEY with AMERICAN MINE DOOR



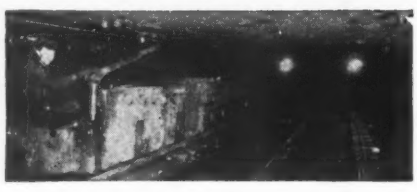
ECONOMICAL AUTOMATIC DEVICES . . .

*Reduce Costs, Increase Tonnage!*

**THE AMERICAN AUTOMATIC DOOR** . . . requires no attendant—opens automatically in a split second and closes same way when last car has passed—no slowing down on approach—thus trips are speeded up. Mechanical action is fast and positive. Air flow is maintained at constant speed to carry off accumulated gas.



**THE CANTON AUTOMATIC SWITCH THROWER** . . . does everything a switchman can do and does it faster with safety. Automatically throws switch points ahead or behind trip—or both. Trip maintains full speed. Switch can be operated by motorman, remote control or by hand and is adapted for use with automatic DERAILER.



**SIGNALS** . . . warn interfering trips and clear the way for non-stop main line trips. Prevent collisions and enable all trips to move with safety and speed.

These automatic devices make for perfect coordination of loading, transportation and tipple by eliminating lost time and speeding trips efficiently and safely. Our sales engineers will be glad to inspect and recommend installations that will save man hours, improve *safety*—no obligations. Canton devices pay for themselves—quickly. Complete catalogues on request.

**AMERICAN MINE DOOR CO.**

**2057 DEUBER AVE., CANTON 6, OHIO**


## Preparation Facilities

Montana Coal & Iron Co., Foster Creek Mine, Bear Creek, Mont.—Contract closed with McNally-Pittsburg Mfg. Corp. for washery addition consisting of McNally-Norton automatic washer to clean 3x¼-in. coal at rate of 125 t.p.h., complete with water-handling and clarification equipment.

J. A. Terteling & Sons, Hanna, Wyo.—Contract closed with McNally-Pittsburg Mfg. Corp. for raw-coal preparation plant consisting of mine-run screens, conveying, crushing and loading equipment for 100 t.p.h.

Johnstown Coal & Coke Co., Portage No. 2 Mine, Portage, Pa.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washing plant to handle 60 t.p.h. of 2x⅜-in. coal; new plant to be adjacent to existing tipple and to be complete with scalping and sizing vibrators, raw-coal conveyor, clean-coal conveyor and refusal-disposal conveyor.

Johnstown Coal & Coke Co., Manor No. 3 Mine, Vindex, Md.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washing plant to handle 60 t.p.h. of 2x⅜-in. coal; new plant to be adjacent to existing tipple and to be complete with scalping and sizing vibrators, raw-coal conveyor, clean-coal conveyor and refusal-disposal conveyor.

Johnstown Coal & Coke Co., Crichton No. 4 Mine, Panther Creek, W. Va.—Contract closed with Kanawha Mfg. Co. for six-grade tipple consisting of primary shaker screens, vibrators for fine-coal screening, boom loading for lump, egg, stove and pea; loading chutes for nut and slack; including crushing, recirculating and reassembling features.

Lando Coal Corp., Lando Mines, W. Va.—Contract closed with Jeffrey Mfg. Co. for screening to handle 150 t.p.h. of mine-run raw coal feed.

Red Lands Coal Co., Red Lands, Pa.—Contract closed with Roberts & Schaefer Co. for Stump air-flow cleaning plant to treat 0x¼-in. slack; capacity, 70 t.p.h.; to be in operation Sept. 1.

Morris Run Coal Mining Co., Morris Run, Pa.—Contract closed with Roberts & Schaefer Co. for Stump air-flow cleaning plant to treat 50 t.p.h. of 0x¾-in. coal; to be completed Dec. 1.

Island Creek Coal Co., Mine No. 15, Verdunville, W. Va.—Contract closed with Roberts & Schaefer Co. for combination wet and dry cleaning plant embodying R&S hydroseparators to treat 5x¼-in. coal at rate of 150 t.p.h. and Stump air-flow unit to clean 35 t.p.h. of 0x¼-in. coal.

Island Creek Coal Co., Mine No. 16, Verdunville, W. Va.—Contract closed with Roberts & Schaefer Co. for combination wet and dry cleaning plant embodying R&S hydroseparators to clean 150 t.p.h. of 5x¼-in. coal and Stump air-flow unit to clean 35 t.p.h. of 0x¼-in. coal.

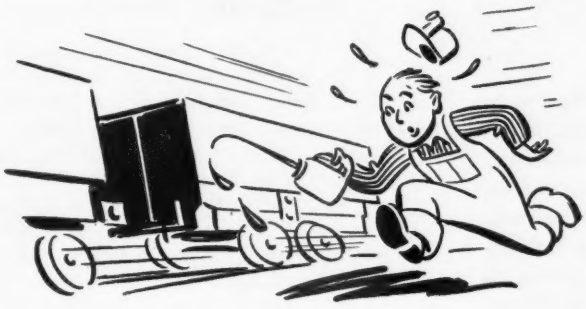
West Kentucky Coal Co., Earlington, Ky.—Contract closed with Roberts & Schaefer Co. for washing plant embodying R&S tandem hydroseparator to clean 1¼x¼-in. coal; capacity, 170 t.p.h.; to be completed Dec. 15.

Northwestern Illinois Coal Corp., Morris, Ill.—Contract closed with Mc-

# Mine Lubrication *News*

Practical suggestions from the field on how Lubrication Engineering and lubricants are being used by midwest mine operators to lick tough jobs.

**SEPTEMBER, 1944**



## Save labor and lubricant on mine car wheels.

Plain type bearings on car wheels at an Illinois mine were lubricated with black oil—and oiled practically every round trip. It kept a man busy almost continuously watching these cars alone. A Standard Oil Lubrication Engineer suggested trying a special lubricant—a mine car grease which he had used successfully on other car bearings. Examination showed that the grease would feed through the holes in the journals but would not be thrown off by speed. A trial showed the grease lasted 2 to 4 weeks without attention—many round trips instead of one. This meant a big saving in time and even some saving in lubricant cost over the cheaper black oils.

## Stanodrip keeps deep-well pump on the job.

A Minnesota operator found it necessary to shut down a deep-well pump periodically to clean the motor windings. Oil in the top bearing of the pump motor would creep along the shaft and saturate the winding. That was two years ago. At that time a Standard Oil Lubrication Engineer recommended Stanodrip #39—a special dripless oil—for this bearing. Since then it has not been necessary to shut down the pump once for cleaning the motor or for making any repairs to the bearings.

## Less steam cylinder lubricant gives better lubrication.

Although cylinder oil feeds in a Missouri plant were high—much less than 1,000,000 square feet of rubbing surface per pint of oil—there was much engine groaning—excessive wear, and generally rough operation. This was an ideal spot to show the qualities of Stanocyl D—an improved steam cylinder oil recently developed by Standard Oil. With it, the difference in operation was immediately apparent. There was a noticeable improvement in the valve action. The engine ran smoother and freer. But, best of all, oil feeds in the lubricator were set at 1,200,000 feet per pint of oil. Find out if the improved Stanocyl D won't give you better lubrication with less lubricant. A Standard Oil Lubrication Engineer will help you make the test.

**You can get the same Lubrication Engineering Service** that helped solve the few examples cited above. They are only typical of the daily problems each of the many Standard Oil Lubrication Engineers—located throughout the 13 states indicated on the map—are called upon to solve. The combined experience of these Engineers is available to you in the Lubrication Engineer located near your plant. The products he has to recommend have been developed and proved in service by the work of this corps of Engineers. You can reach the Engineer nearest you by calling the Standard Oil Company (Indiana) office, or writing 910 South Michigan Avenue, Chicago 80, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

*Gasoline Powers the Attack . . . Don't Waste a Drop!*

**STANDARD OIL COMPANY (INDIANA)** STANDARD SERVICE

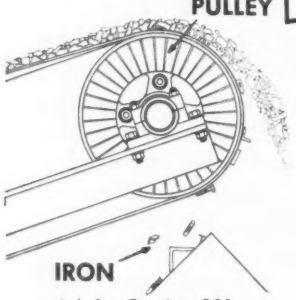
★ LUBRICATION ENGINEERING

# How to Select A MAGNETIC SEPARATOR

● There's more than meets the eye in magnetic separators. Before you buy check two things: 1. Is it the type of separator best suited to your needs? 2. Is it designed and built for maximum separating efficiency and years of service by a manufacturer skilled in the magnetic separation field?

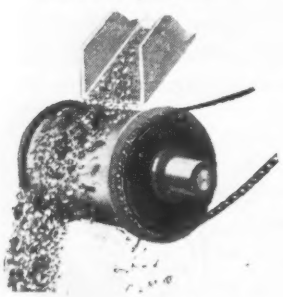
The Dings Magnetic Separator Co., world's largest exclusive builders of electro-magnetic equipment, offers a complete line of separators designed as a result of experience on hundreds of successful preparation plant installations. For information, write today.

**PULLEY**



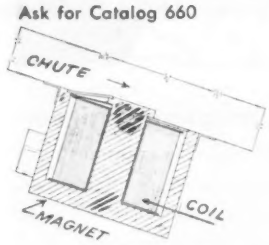

Ask for Catalog 250

The Dings High Intensity Magnetic Pulley is designed for installation as head pulley in a belt conveyor system. It is completely automatic, removing and discharging the iron. It incorporates air-cooled construction and *bronze* spacer rings which do not short circuit lines of force.



Ask for Catalog 660

Dings High Intensity Magnetic Drums may be installed at the bottom of chutes or in other places where a stationary installation is desirable. A cylindrical shell revolves around a powerful stationary magnet. Operation is completely automatic.




Ask for Catalog 301

Dings High Intensity Double Gap Spout Magnets are installed in chutes. Iron accumulates on the face of the magnet. Available with automatic Safety Gate which blocks the chute and discharges iron when current is interrupted.

Ask for Catalog 301

The Dings High Intensity *Rectangular* Suspended Magnet is the latest development in suspension magnets. It is widely used above conveyor belts where pulleys are not applicable or desirable. Not automatic.

**DINGS MAGNETIC SEPARATOR CO.**
**506 E. SMITH STREET, MILWAUKEE 7, WISCONSIN**
*World's Largest Exclusive Builder of Magnetic Equipment*

Dings MAGNETIC SEPARATION HIGH INTENSITY


Nally-Pittsburg Mfg. Corp. for complete tipple and washing plant to crush, size and clean strip-mine coal at rate of 150 t.p.h.; McNally-Norton automatic washing system to clean 0x4-in. coal at rate of 150 t.p.h.; plant to have high-capacity bins and blending equipment to facilitate mixing of cleaned coals for both truck and rail loading; to be completed Dec. 1.

Duryea Anthracite Co., Hudson, Pa. —Contract closed with Deister Concentrator Co. for one No. 7 SuperDuty diagonal-deck washing table to treat barley coal and another to handle No. 4 buckwheat.

Nerve Coal Co., Throop, Pa.—Contract closed with Deister Concentrator Co. for one No. 7 SuperDuty diagonal-deck washing table to treat No. 2 buckwheat.

●

## Personal Notes

Sam J. Bates has been named as manager of the Sandlick mines of the Wright-Holland Coal Co., Whitesburg, Ky.

F. W. Arms has been appointed general manager of the Rockhouse Elkhorn Coal Co., Deane, Ky. He has been connected with the company for several years.

R. E. Crawford has been made general superintendent of the Crawford Coal Co., Whitesburg, Ky.

Ralph E. Kirk, manager of raw materials, Tennessee Coal, Iron & Railroad Co., has been elected president of the Engineers' Club of Birmingham, Ala.

Dr. Harold D. Kuehner, member of the staff of Mercy Hospital, Pittsburgh, Pa., has been appointed chief surgeon of the Pittsburgh Coal Co. Assistant chief surgeon of the company since Aug. 1, 1921. Dr. Kuechner succeeds Dr. Grover C. Weil, who died in mid-August.

Hewitt Smith, Woodward Iron Co., Alabama, has been promoted from superintendent of Mulga coal mine to assistant general superintendent of mining and milling operations in place of J. E. Urquhart, resigned.

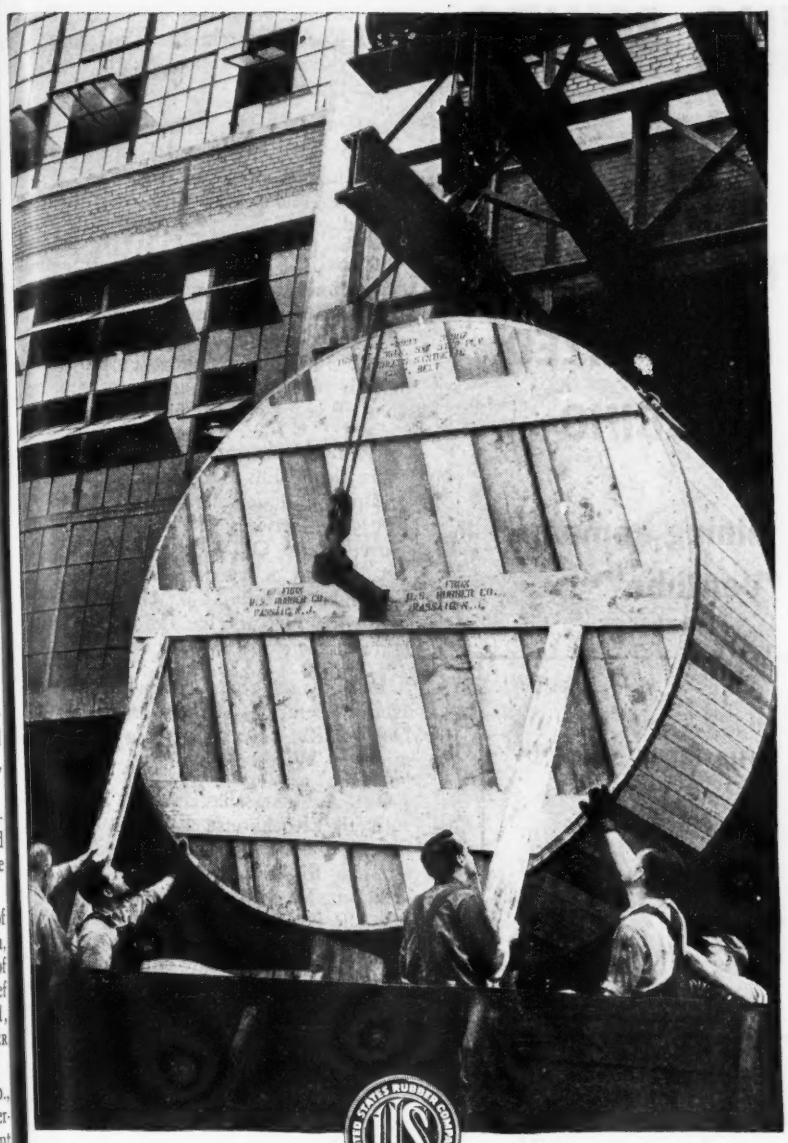
T. H. Kirk has been appointed superintendent of Mulga mine of the Woodward Iron Co., Mulga, Ala.

Paul Ford has been made superintendent of Dolomite mine of the Woodward Iron Co., Woodward, Ala.

Clifford L. Fishback, Columbus, Ohio, has been elected chairman of the board and secretary of the Lando Coal Corp., Lando Mines, W. Va. Frank P. Smith, Huntington, W. Va., has been named president, and Herbert L. Thompson, Cincinnati, Ohio, has been made vice president and treasurer.

John S. McGhee has been appointed general superintendent of Island Creek Fuel & Transportation Co., with offices in Huntington, W. Va. Succeeding Walter A. Buchanan, who was named last spring as managing director of the Huntington Chamber of Commerce, Mr. McGhee has been superintendent of Island Creek's Mine No. 22, at Holden.

John C. Cosgrove, consulting engineer of Johnstown, Pa., has been elected a director of the Pennsylvania Research Corp. Having had a keen interest in research for many years, he was chairman of



# 22,575 POUND PACKAGE OF ENGINEERED RUBBER BELTING

Another big U.S. Conveyor Belt starts on its journey to the mines, and a long career of faithful service. Only part of the belt—1650 feet in length, 10 feet 11 inches in diameter—is contained in this crate. Another section measuring 1534 feet and weighing an additional 20,840 pounds is forwarded separately.

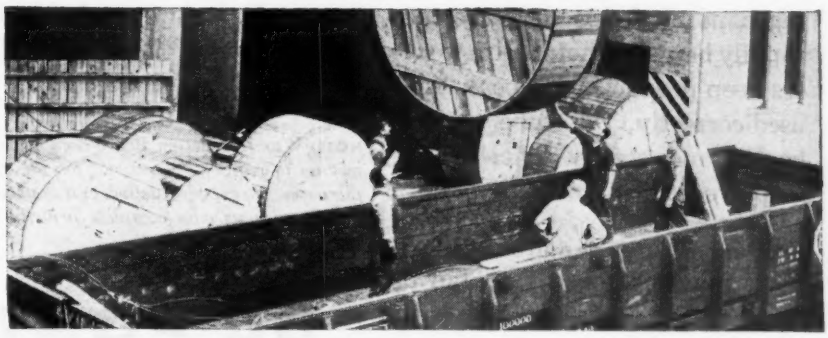
Every ounce . . . every inch of this giant belt reveals the practical value to industry of U.S. Rubber engineering.

Conveyor Belts—individually designed and fabricated—are constantly being produced, not only for underground coal mining but for *every type of industry*.

U.S. Rubber engineering covers the scientific application of rubber compounds for specific requirements. A highly trained staff is prepared to cooperate with operators on any type of conveyor belt problem . . . to design the proper belt for its specific job.

***SERVING THROUGH SCIENCE***

**SPECIAL TECHNIQUES**—Into each U.S. Conveyor Belt goes the accumulated technical skill gained over a long period of years. Design and construction are determined by a practical as well as a scientific knowledge of the functional purpose of the finished product.



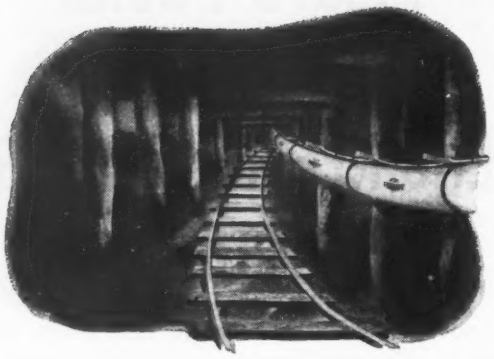
**CUSTOM-MADE BELTS**—Here, ready for shipment are U. S. Conveyor Belts of varying sizes, intended for widely differing services. Each is an individual job . . . each with "built-in" qualities that make it serviceable and economical under specific conditions. All have the strength, toughness, flexibility, and design that mean long, economical conveyor belt performance.

*Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.*

## UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

# WHY MANY LEADING MINES



*use*

## THIS FLEXIBLE, RUBBERIZED TUBING

**Here's what one southern coal mining company has to say about Du Pont "Ventube"***

| WE ASKED: | THIS MINE SAID: |
|---|---|
| 1. Has "Ventube" helped to enable employees to meet increased production schedules? | 1. Yes. |
| 2. How much time is normally required for "Ventube" to clear the working face between blastings? | 2. Three to five minutes. |
| 3. What do the men who do the mining think of "Ventube"? | 3. They like it. |

WHEN WAR PRODUCTION schedules are toughest to meet, Du Pont "Ventube" flexible, rubberized duct lends miners a helping hand. It helps clear the face rapidly between shots, helps workers keep production at peak. And used correctly, "Ventube" guards health and steady efficiency of employees.

**Properly suspended,** free of sharp bends, and attached to a fan of adequate air capacity and with permissible motor, "Ventube" sweeps the face with clean, fresh air. It is effective in carrying air where it is most needed. "Ventube" is easy to install, easy to use. It can be stored in small space.

Coated and impregnated with a special chemical compound, "Ventube" resists abrasion, moisture, mildew, dry-rot, acid and alkaline waters. E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Division, Fairfield, Connecticut.

**NOTE:** *War Production Board regulations permit us to supply "Ventube" for all mining purposes. To expedite delivery, it is urged that you furnish us with complete priority information on your orders.*

## DU PONT "VENTUBE"

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

*"VENTUBE" is Du Pont's registered trade mark for its flexible, rubberized ventilating duct.*

*Don't pay more than ceiling prices! • Don't buy on the black market! • KEEP PRICES DOWN!*


the committee which organized Bituminous Coal Research, Inc., and became its first president, a position he held for several years.

M. R. BARKER, assistant superintendent of No. 22 mine, Island Creek Coal Co., Holden, W. Va., has been advanced to superintendent, vice John McGhee, promoted.

GEORGE F. MILLER, mine foreman at Westmoreland colliery of the Lehigh Valley Coal Co., Wilkes-Barre, Pa., was honored July 30 at a banquet attended by about 300 of his fellow employees and friends marking his retirement after more than 50 years' service with the company.

AMBERS SPRADLIN, Hazard, Ky., 66 years old, claims the longest active record of any coal miner in that field, completing 51 years' service July 28. He is employed by the Old King Mining Co., Tribbey, Perry Co. FRANK CHAPMAN, Hardy-Burlingham Mining Co., Hardburly, Perry Co., with 46 years, has the second longest known record in that area.

FRED ELLER has been named as manager of operations of the Dorton Coal Co., Dorton, Ky. He formerly operated local mines at Wales, Ky.

BEN A. ADAMS has resigned his position with the Rockhouse Elkhorn Coal Co., Inc., Rockhouse, Ky., and has become mine foreman for the Elk Horn Coal Corp., Jackhorn, Ky. He formerly was connected with the Elk Horn company.

R. T. HILL, formerly superintendent at Colta mine, Alabama By-Products Corp., Flat Creek, Ala., has been transferred to Barney mine, Cordova, Ala., where he will serve in a similar capacity.

D. G. LAIRD, formerly mine foreman at the Praco mine, Alabama By-Products Corp., Praco, Ala., has been named superintendent at Colta mine, Flat Creek, Ala.

J. E. WEED, formerly superintendent at Barney mine, Alabama By-Products Corp., Cordova, Ala., has been transferred to Labuco mine, Labuco, Ala., as superintendent.

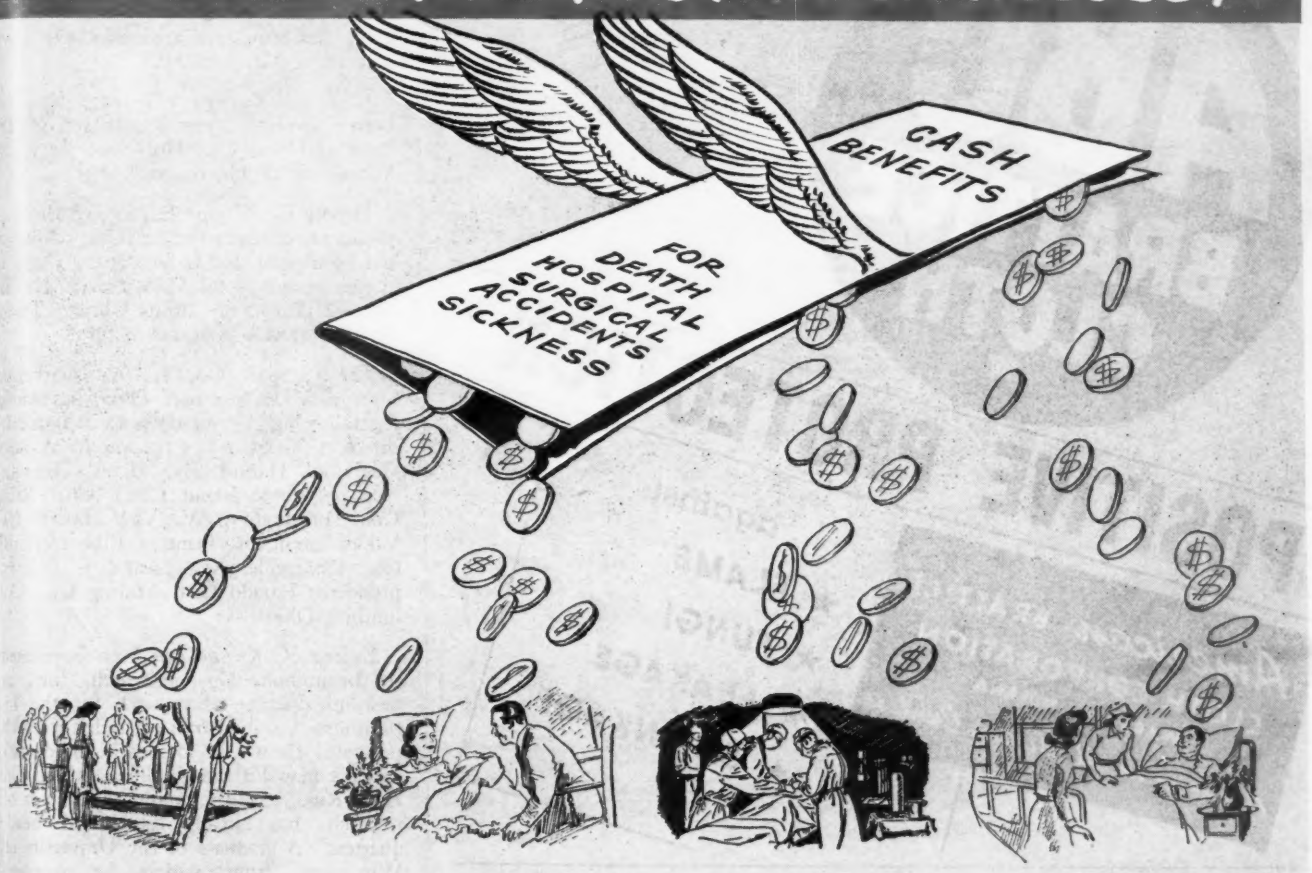
J. J. BEAVER has resigned as general superintendent of mines for the Boothton Coal Mining Co., Boothton, Ala. R. L. LITTLEFIELD, formerly night foreman at Boothton No. 4 mine, has been appointed acting superintendent.

CHARLES A. CORWIN, Hazard, Ky., has been named assistant manager of the F. W. Arms Coal Co., Deane, Ky., a recent addition to the eastern Kentucky field.

KEITH D. PFOOR has resigned his position as deputy chief of the Coal Section of the War Production Board's Mining Division, effective Sept. 1, to return to his former post with the Mine Safety Appliances Co., Pittsburgh, Pa. He will be succeeded by HAROLD B. WICKEY, who has been with the Mining Division since May, 1942.

G. GRIFFITH JOHNSON, price executive of the Solid Fuels Price Branch, Office of Price Administration, for the last year and a half, has been appointed special as-

# WINGS OF MERCY—READY WHEN NEEDED!




## RECENT CLAIMS PAID TO EMPLOYEES OF ONE LARGE COMPANY INCLUDE—

**39** Death Claims paid to employees and their families.

**408** claims paid for childbirth. Mother and baby need extra care at this most important time.

**401** claims paid for surgical operations on employees and their dependents.

**843** claims paid for hospital confinement of employees and their dependents.

## OTHERS LIKE IT

The value of this plan is evidenced by the fact that hundreds of companies which have made Protective Life's plan available to their employees continue it in force year after year. The plan is "tailor made"—often, the employer suggests the benefits, both as to amounts and combinations that would best fit his employees.

## HELPS MANAGEMENT

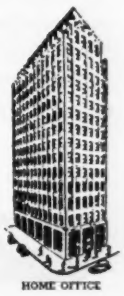
Machines need repairs—employees do too. Many of the claim payments referred to have changed physically unfit employees from chronic time-losers to time-savers and into more efficient employees.

## NO COST TO EMPLOYER

The employee pays the entire cost which is only a few cents a day—he profits by it, and the company profits by it too. *At present, because of tax laws, some employers find that, at very little expense to their company, they can give the protection to the employees and their families, or contribute a substantial part of the premium.*

Let us furnish you, without obligation, names of concerns who have such a plan for their employees, or submit a plan for your consideration.

# PROTECTIVE LIFE
INSURANCE COMPANY


HOME OFFICE

WILLIAM J. RUSHTON
President

BIRMINGHAM
ALABAMA

ABC BRATTICE CLOTH ★

POSITIVE PROTECTION

against
★ FLAME
★ FUNGI
★ LEAKAGE
★ SHRINKAGE

American BRATTICE CLOTH CORPORATION
WARSAW, INDIANA
Agencies in all Mining Centers

sistant to the Deputy Administrator for Price, succeeding JACOB ROSENTHAL, who has returned to private industry in New York City. JAMES HAROLD REPPERT, associate price executive since September, 1943, has been appointed price executive, succeeding Mr. Johnson.

CHARLES YOUNCE, Fleming, Ky., has been appointed general manager of the Premium Coal Co., Hot Spot, Ky., vice Woodford Webb, resigned.

HENRY C. WOODS JR., son of the vice president of Sahara Coal Co., Chicago, has been promoted to lieutenant (j.g.) in the air service of the U. S. Navy. He has been stationed at Corpus Christi, Texas, for the last year as an instructor.

APPALACHIAN COALS, INC., marketing organization, Cincinnati, Ohio, has added the following new members to its board of directors: GEORGE P. FITZ, president, Ajax Coal Co., Hazard, Ky.; H. A. GLOVER, vice president, Island Creek Coal Sales Co., Huntington, W. Va.; HARRY LAVIERS, president, Princess Elkhorn Coal Co., Paintsville, Ky.; LARRY J. LORMS, president, Lorado Coal Mining Co., Columbus, Ohio.

ELMER R. KAISER has been appointed by Bituminous Coal Research, Inc., as assistant director of research for the bituminous coal industry's expanded research program. He will be located in the organization's new Pittsburgh office, where Dr. H. J. Rose, recently appointed director of research, has already established headquarters. A graduate of the University of Wisconsin, from which he received bachelor's and master's degrees in mechanical engineering in 1934 and 1935, respectively, Mr. Kaiser has been engaged in coal research since 1932. He has been associated with the coal industry's research program since 1935 as a research engineer at Battelle Memorial Institute.

E. MAXWELL CASSIDY, who was night mine foreman at Dresser mine, Walter E. Bledsoe & Co., Terre Haute, Ind., at the time he joined the armed forces, has been given a battlefield promotion from captain to major in the combat engineers in Normandy.

PAUL KIRK has been appointed superintendent by the Seymour Coal & Mining Corp., Herrin, Ill. Heretofore he has been chief electrician for both this company and the Freeman Coal Mining Corp.

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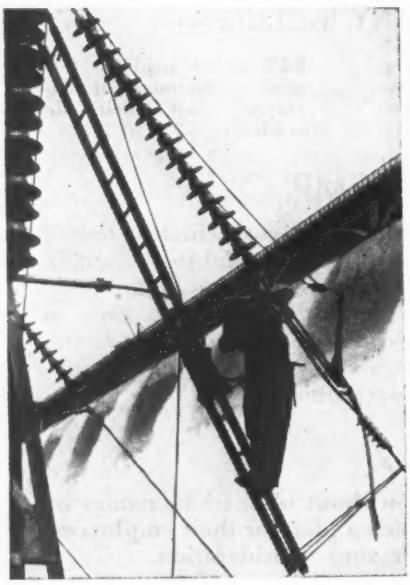
## Association Activities

DRUMHELLER COAL OPERATORS' ASSOCIATION has been organized by coal operators at Drumheller, Alta., with these officers: president G. T. Richards; vice president, J. F. Harvie; treasurer, H. J. Scott; secretary, V. A. Crooney; directors, H. W. Clark, W. Gouge, T. Smith, F. J. Whitlock and H. H. McVeigh, who constitute the executive committee.

NORTH FORK CHAPTER, COLORADO COAL MINE OFFICIALS' SOCIETY, met Aug. 4 at Somerset, Colo., to bid farewell to two departing members and welcome



*Pictured above is a lineman Ned Ingalls who, with the aid of a Coffing "Safety-Pull" hoist, is man-handling a soon-to-be "hot" wire, as he imitates the "man on the flying trapeze" from his dizzy perch at Grand Coulee Dam.*

COFFING HOISTS

We do not claim that Coffing Hoists are the final and perfect achievement, but for 16 years our hoists have been doing their jobs well.

We do claim that Coffing Hoists are the best we know how to build and experience shows them to be generally efficient. (The Army and Navy wouldn't be using them if they weren't.)

We hope that Coffing Hoists are helping to hasten the day of peace—the day our boys can come home again—the day you can call your supplier and say: "Send me a Coffing Hoist"; and your supplier can reply: "Coming right up, brother, we've got 'em in stock."

WRITE TODAY FOR CATALOG No. 000 G-6.

RATCHET LEVER HOISTS
SPUR GEARED HOISTS
ELECTRIC HOISTS

COFFING HOIST COMPANY
Danville, Illinois, U. S. A.

# . . . AN ADVANTAGE THAT ONLY RED CROWN OFFERS

● What makes King's Red Crown—the *patented,* surface-sensitized Class A Permissible—the outstanding success it has been ever since its introduction in 1938?

The answer is *distributed power.* Red Crown does not do too much *at* the holes and too little *between* them. Its slow-action, pushing, spreading effect is distributed evenly all through the cut.

The result? Full, even displacement—firm, hard lumps—the least possible pin cracks and pulverization. And Red Crown is easy on the roof.

Ask your King Powder salesman to tell you about Red Crown's distributed power. Or write, wire or phone us directly (MAin 4609, reverse charges). Let us demonstrate Red Crown in your mine—under *your* special operating conditions. We know you will be using this superior powder from that time on.

**THE KING POWDER COMPANY, INC., CINCINNATI 1, OHIO**

INCORPORATED 1878

**RED KING EXPLOSIVES CROWN**

**THE PATENTED, SURFACE-SENSITIZED PERMISSIBLE**

# TAMP . . . TAMP . . . TAMP

*The Boys are Blasting*

WITH

# SEAL-TITE Tamping Bags

*...to Beat*

**THE 1944**

**WAR PRODUCTION**

**QUOTA**

They provide full proper tamping for safe, efficient shooting of shot holes simple and inexpensively. They reduce the number of charges by increasing the effectiveness of every charge —less explosive is needed and danger of shattering heavy blasts which endanger working structures is eliminated. They are carefully manufactured to assure dependable, economical service. They conform with rigid high standards of quality and safety. Supplied in any width—any desired length or weight of paper. Find out why so many mine operators prefer SEAL-TITE Safety Seam Tamping Bags —Write for particulars.

**THE TAMPING BAG COMPANY**

**MOUNT VERNON, ILLINOIS**

their successors. Andrew J. Sager, superintendent, Somerset mine, Calumet Fuel Co., and president of the local branch of the society, resigned both posts, being succeeded in the latter by Abel Audin, of Hawks Nest mine, and in the former by R. W. Whittaker, of Castle Gate, Utah. George Edwards announced the sale of his mine in the region and introduced J. E. Blair as the new man in charge. A dinner was served by the Camp Fire Girls followed by a talk by Samuel G. Porter on western Colorado's dormant coal wealth.

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## Coal Publications

*Coal Resources of the Kansas City Group, Thayer Bed in Eastern Kansas*, by W. H. Schoewe, State Geological Survey of Kansas, Lawrence, Kan. Bull. 52, Part 3, 136 pp., 6¼x9 in.; paper. Thayer bed runs from a mere streak to 29 in. Average thickness is 10.1 in. and total reserves are 37,000,000 tons underlying 29,000 acres in Wilson, Neosho, Montgomery, and Linn counties. Much of it can be stripped.

*Testing Safety Catches on Mine Cages at Some Eastern Bituminous Coal Mines*, by H. J. Sloman, U. S. Bureau of Mines. I. C. 7290, 30 pp., 8x10½ in.; mimeograph; paper; 10 pp. of drawings. Contains laws of several states, shows actuating mechanisms and illustrates testing methods. Urges provision of safety belts and releasing mechanisms for testers, daily inspection and inspection after test, for test may have damaged catch.

*Suggested Hoisting-Signal Code for Slope Coal Mines and for Shaft Mines Having Only One Level*, by D. Harrington and J. H. East Jr., U. S. Bureau of Mines. I. C. 7291, 9 pp., 8x10½ in.; mimeograph; paper. Contains rules also for suspending of signal wires and for operating signals.

*Arc and Acetylene Welding*, by Harry Kerwin. McGraw-Hill Book Co. 240 pp., 5⅜x8⅛ in.; cloth; price, $2.50. A practical manual for the welder. Has chapters on cast-iron and aluminum welding.

*Analyses of Virginia Coals*, many authors, U. S. Bureau of Mines. T. P. 656, 159 pp., 5⅞x9¼ in.; paper; price, 15c. Introduction covers geography, geology, working methods, haulage, ventilation, structure, operational practice, preparation, production, stripping, transportation, marketing and coking of Virginia coals.

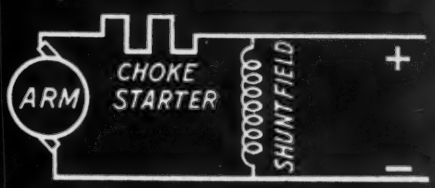
*Industrial Electronic Control, a Guide to the Understanding of Electronic Control Circuits for Industrial Uses*, by W. D. Cockrell. McGraw-Hill Book Co.; 227 pp., 5½x8½ in., cloth; price, $2.50.

*Salvage of Coal From Mine Refuse in the Pittsburgh District*, by T. Fraser, J. A. Kelley and H. G. Graham, U. S. Bureau of Mines. R. I. 3768, 37 pp.; 8x10½ in.; mimeograph. Typical samples of float coal from roof fall material, roadway cleanings and hand picking rejects had around 10 percent ash, 13,500 B.t.u. per pound and 2,480 deg. F. ash-softening temperature. To repay cleaning at least 300 tons of mine refuse should be handled daily.


AUTOMATIC
D. C. MOTOR STARTER

G.M.C. CHOKE STARTERS

* No Moving Parts
* Line Starting
* Stops Commutator Arcing
* Voltage Drop Across Resistance High at Start Low at Running Speed
* Low First Cost
* Low Maintenance Cost
* Ideal for Pump or Conveyor Motors
* ½ H. P. to 25 H. P. Sizes

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GUYAN MACHINERY CO.
LOGAN WEST VIRGINIA



# Help speed coal to consumers

## Freezeproof Shipments with Wyandotte Calcium Chloride

Mining coal twice—once at the mine and again when it's frozen in the car—means lost delivery time and extra labor.

Help hard-pressed dealers to meet delivery schedules this winter by freezeproofing your coal with Wyandotte Calcium Chloride.

Coal properly treated with Wyandotte Calcium Chloride unloads readily at any temperature. It comes out of the car the same grade as when loaded. Freezeproofing coal also conserves vitally needed cars by cutting unloading time.

No special equipment is needed to handle Wyandotte Calcium Chloride for freezeproofing. The material may be applied by hand shovel in dry flake form—exactly as it comes out of the bag.

Just fill in the coupon for information about Wyandotte Calcium Chloride—the safe, reliable and economical agent for treating coal.

Wyandotte REG. U. S. PAT. OFF. CALCIUM CHLORIDE
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Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

*Name* _____

*Address* _____

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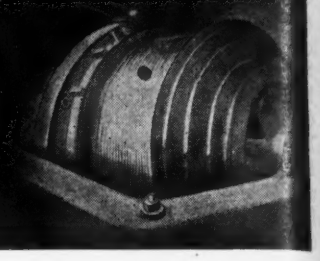
# TIPS FROM MANUFACTURERS



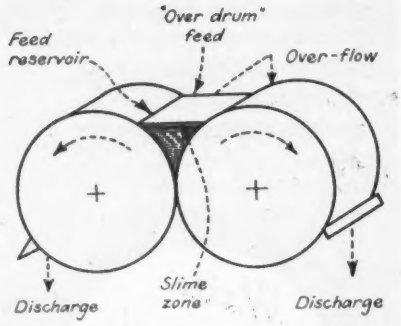
## Filter

Peterson Filters & Engineering Co., Salt Lake City, Utah, offers the new "Syncro-Drum" filters for dewatering coal fines. The filter is essentially two synchronized drums with a feed reservoir above the center line and a new type "depth-filter medium" made up of cocoa matting on edge (see illustration). This filter medium, according to the company, withstands the excessive abrasion resulting from handling a wide range of particle sizes and therefore provides long life. Any variation in tonnage, it is further stated, is taken care of by overflow provisions, thus rendering attendance unnecessary. All fractions up to $\frac{1}{8}$ in. x 28 mesh can be handled, the company declares.

Two applications in handling minus 28-mesh suggested by the company are shown in the accompanying flowsheets. In No. 1 the objective is dewatering the entire 28-mesh fraction, depending upon the thickener for clear overflow to bleed off water to waste, since the Syncro-Drum filter, after equilibrium has been reached in the minus 200-mesh product, will handle the current 200-mesh output of the washer. Anticipated cake moisture is 17 to 25 percent, according to the company, which can be reduced to 10 to 18 percent if hot-air hoods are employed.

In No. 2 flowsheet, disk filters are used to assure a clear filtrate and to make a split in the minus 28-mesh fraction so that if the 100-mesh is high in ash it can be wasted. Expectations, the company states, are 12 to 17 percent cake moisture (7 to 15 percent with hot-air hoods) and 20 to 25 percent moisture in the cake discharged from the disk filters.

In any application, the manufacturer declares, methods can be adopted that will




deliver economically coal fines with a moisture content permitting sale; that will eliminate freezing in cold weather; and that will prevent silting and stream pollution. Freight savings and savings by eliminating freezeproofing materials are other possibilities.

Applications are numerous, the manufacturer declares, since the fundamental overfeed principle of the Syncro-Drum equipment can be adapted to numerous coal-washing plants. The new "depth-filter medium," it is stated, makes it possible to operate for extended periods without replacement.

•

## Compressor Control

Electro-Mechanical Division, Manning, Maxwell & Moore, Inc., Bridgeport, Conn., offers the Ashcroft Compressor-Trol, combining seven devices for control of compressor operations into a single compact unit. It is designed to eliminate the necessity of using pipe and pipe fitting, simplifying installation and reducing the possibility of air leakage.

It is made in $\frac{1}{2}$-, $\frac{3}{4}$- and $1\frac{1}{4}$-in. sizes—determined by inlet connection—to cover all requirements of tank-mounted compressors up to 15 hp. or 60 cu.ft. per minute. It is equipped with the Ashcroft Duraswitch, with either an electric or mechanical attachment for operating the two-way unloading valve mounted on the Compressor-Trol casting.

• Muffler on the compressor discharges into the tank and acts to break up the discharge and to disperse the air in a manner that insures adequate mixing with the cooler gases in the tank to reduce the temperature and moisture content before delivery.

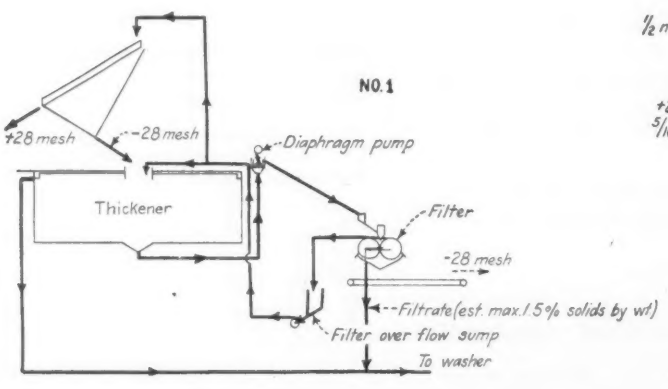
The combined Ashcroft Duraswitch and gage has a heavy-duty gearless movement, slide-rule dial, a horizontal self-draining and non-freezing Bourdon tube, and the entire gage is completely removable and replaceable in case of accidental damage.

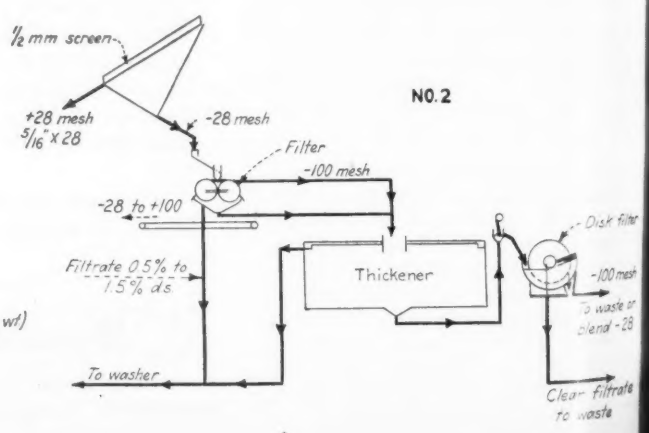
•

## Synthetic Insulation

Nubun, a new synthetic rubber latex insulation for power, lighting and communication cable, has been developed by United States Rubber Co., Rockefeller Center, New York City. The new insulation is stated to be a result of wartime developments in rubber technology and will permit the design of new types of wire and cable with improved electrical and physical characteristics. Made by the latex continuous-dip method, Nubun, it is said, will have great advantages over ordinary wire where replacement and space are important factors.

Qualities of Nubun insulation cited include flexibility, impermeability to water, laminated construction and perfect centering of the conductor to produce an insulated wire of maximum conductivity and minimum diameter. The synthetic in-



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YOUR supply problems may not present difficulties like the jungle, but they can cause plenty of other headaches. And they can hold up the main supply line to the Armed Forces. Perhaps we can help you out of a jam. A call to us has broken many a bottleneck—speeded many a war order.

If you need steel, steel products, tools and machinery, phone, wire or write our nearest warehouse. We'll get what you need into your hands in a hurry, if at all possible—subject, of course, to priority requirements.

Even today, our stocks are large. They include National Emergency Alloy Steels, which have proved so successful in meeting conditions resulting from the shortage of critical materials. Try us. Your call will receive prompt attention. And nine warehouses, located in the great production centers, assure quick delivery of material on hand.

## For Welding Needs

We can supply Welding Wire, for electric arc welding, such as:

**STAINLESS STEEL ELECTRODES**
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We also offer Welding Machines, Protect-O-Metal for elimination of weld spatter and Havens "C" Protected Clamps. Write, phone or wire our nearest warehouse.

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UNITED STATES STEEL SUPPLY COMPANY

USS STEELS

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| BOSTON (34), | 176 Lincoln St., Allston, P. O. Box 42 | Teletype BRTN. 10 | STAdium 9400 |
| CLEVELAND (14), | 1394 E. 39th St., | Teletype CV. 153 | HEnderson 5750 |
| MILWAUKEE (1), | 4027 West Scott St., P. O. Box 2045 | Teletype MI. 587 | Mitchell 7500 |
| NEWARK (1), N.J., | Foot of Bessemer St., P. O. Box 479 | Teletype NK. 74 | Bigelow 3-5920 |
| | | REctor 2-6560 - | BErgen 3-1614 |
| PITTSBURGH (12), | 1281 Reedsdale St., N. S. | Teletype PG. 475 | CEdar 7780 |
| ST. LOUIS (3), | 21st & Gratiot Sts., P. O. Box 27 | Teletype SL. 384 | MAin 5235 |
| TWIN CITY, | 2545 University Ave., St. Paul (4), Minn. | Teletype STP. 154 | NEstor 2821 |

**UNITED STATES STEEL SUPPLY COMPANY**

UNITED STATES STEEL

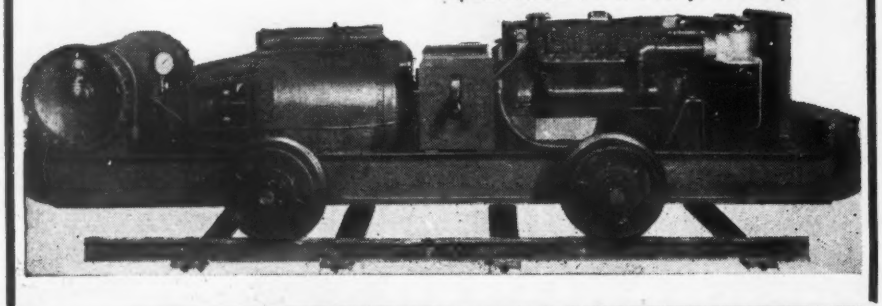
ACME
mine car
COMPRESSOR

This mobile unit only 127 inches long—weighing only 3510 pounds—each end provided with coupling for towing—delivers 92 cu. ft. of air per minute at 100 lbs. pressure.
Designed especially for mine use it is adaptable to both high and low seam operations only 27½" high—particularly mechanized mining.
The car is equipped with one floating and two stub axles eliminating danger of derailment. Furnished in track gauges from 36" to 56".
The "Lowboy" Model 110 shown offers the latest in mine car compressors—sturdily built—efficient—economical to operate.

**WRITE FOR BULLETIN 3920**

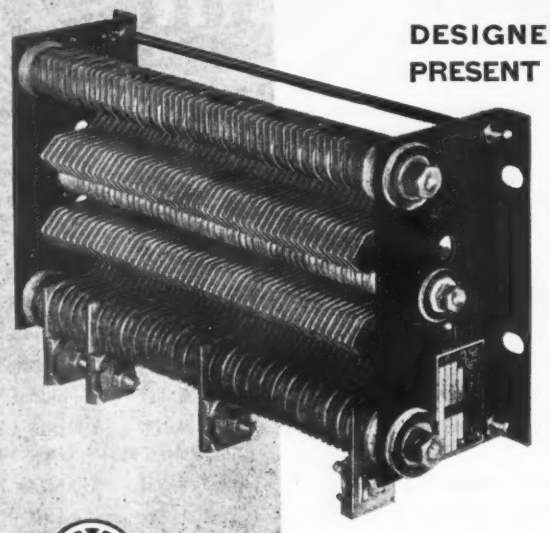
This bulletin shows how well the "Lowboy" is built—details of construction—illustrates sturdy frame design and gives complete specifications. *Write for yours today.*

**Light Weight** **Compact**
**Low Height** **Mobile**



**ACME COMPRESSOR CO.**
Williamson, West Virginia

**P-G *Steel Grid* RESISTORS**
CONSISTENTLY PROVE THEIR VALUE
*for* **MINING MACHINES**



**DESIGNED TO FIT YOUR PRESENT RESISTOR SPACE**

Built of steel and mica—nothing to break—no warping or hot spots—constant in resistance value, regardless of temperature or age. Not affected by vibration, moisture or corrosive fumes. Continuous trouble-free service is assured with . . .

P-G *"The Resistor you can Install and Forget"*

**THE POST-GLOVER ELECTRIC COMPANY**
•ESTABLISHED 1892•
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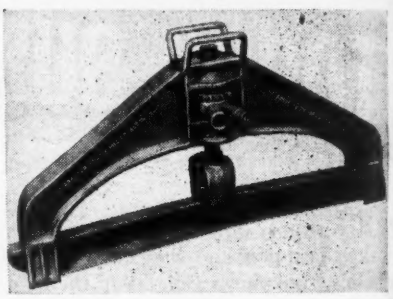
sulation is said to be exceptionally homogeneous following vulcanization and has high electrical characteristics such as dielectric strength and insulation resistance. The special synthetic rubber compound is low in specific conductive capacity, has good aging qualities because of the presence of special antioxidants, and will resist severe wear because, by the nature of the latex process, the rubber particles are not distorted or broken down by milling.

Nubun insulation is made from a special modification of buna S synthetic rubber.

## Rail Leveler

Gibraltar Equipment & Mfg. Co., Alton, Ill., offers a new improved rail leveler unit. L-4 size handles sizes from the smallest to 40-lb. rail inclusive; L-2, smallest to 25-lb.; L-8, 40- to 80-lb. The clamps, at either end of the leveler frame, slip down over the ball of the rail at points immediately adjacent to where the ball of the rail is sunken in, or hogged, and at this point two hinged jaws slip down over the ball of the rail and are free to close tightly around the ball when pressure is applied on the operating screw by means of a ratchet mechanism.



The end of the screw is machined to a half round ball shape and this in turn fits the top, or socket, end of the two hinged jaws. A heavy-duty Timken thrust bearing is contained in the ratchet assembly to absorb thrust stresses. At the top of the frame a double handle protects the top portion of the operating screw and also provides maximum ease and portability.

## Fire Extinguisher

Randolph Laboratories, Inc., 8 East Kinzie St., Chicago, has produced a 25-lb. wheel-type carbon-dioxide fire extinguisher which they state is moved and operated with uninterrupted single-sweep action. Known as the Randolph 25, it features a palm-trigger valve mounted conveniently on the extinguisher steel handle. By grasping the handle the operator can move the unit and press the release button with one hand—discharging a penetrating, icy blanket of carbon dioxide in a large sweeping arc—10 to 20 ft.

Release of pressure on the palm trigger automatically stops the flow of carbon-dioxide gas, eliminates twisting of valves and retains the remainder of the charge for repeated attacks. The long-range 5¾-ft. horn-and-hose connection is said to direct an accurate full charge into the base of

# BOWDIL COAL CUTTING EQUIPMENT

## Watch your costs come down!

## CUT MORE COAL... GET LESS "BUG DUST"

● Maximum coal production means little time out for equipment replacement or repairs. Assure high production and reduced costs with BOWDIL Coal Cutting Equipment.

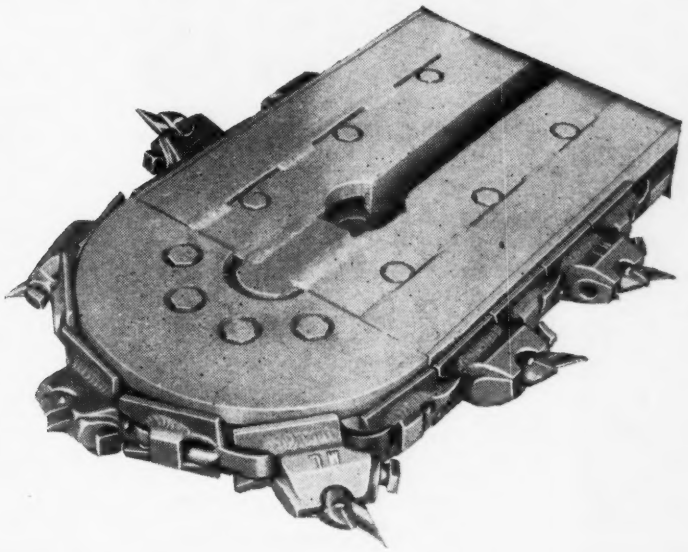
Featured here is the BOWDIL CUTTER BAR. Check these important advantages!

**SAVE TIME CHANGING BITS** (Chain couplings have been designed to make Bit replacement quick and easy thus saving man hours and reducing maintenance time.)

**SAVE POWER** (The thin, compact design of the BOWDIL CUTTER BAR, plus its greater strength and rigidity, reduces power requirements . . . cuts more coal in less time.)

**CUT THINNER KERF** (The thin design of the BOWDIL CUTTER BAR and BOWDIL BITS afford 30% more cutting surface to insure more *coal* and less "bug-dust".)

Investigate the BOWDIL combination — Bar, Bit and Chain—today! A letter will bring complete details.



ASK THE BOWDIL SALES ENGINEER TO SHOW YOU COST-CUTTING EXAMPLES

THE BOWDIL COMPANY • CANTON • OHIO

**One-half of air pumped never reaches the face — You can better that percentage at your mine with —**

*Try the "Blow-Torch Test"*

# MOROPA
## COTTON BRATTICE CLOTH

This is no time to risk production losses through faulty ventilation . . . . MOROPA COTTON BRATTICE CLOTH, as proved in the mines of many leading producers, is the soundest choice for the safety that allows you to boost vital production.

A careful examination of MOROPA'S characteristics reveals the reasons for its acceptance. MOROPA is Flame-Resistant, has low Porosity, Resists Mildew, and gives Maximum Wear.

See data on MOROPA, page 123 of the 1943 Coal Mining Catalog . . . or write us! MOROPA comes in standard widths up to 84 inches. Other sizes special.

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. . . . *made in America, of American Cotton, manufactured by* . . . .

Act today to eliminate unnecessary ventilation risks . . . . install MOROPA.

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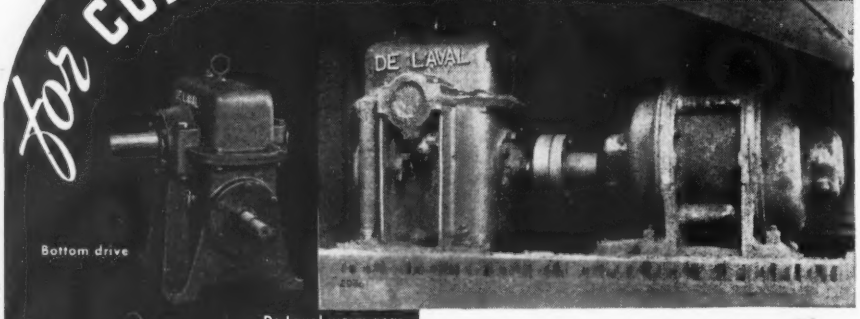
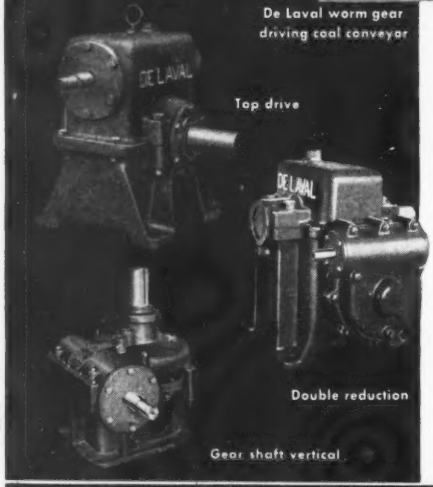
# for CONTINUOUS PRODUCTION




Bottom drive

De Laval worm gear driving coal conveyor




Top drive

Double reduction

Gear shaft vertical

Breakdowns in power transmission in 24-hour plants are eliminated where plant engineers specify the

# DE LAVAL
## WORM GEAR

for heavy duty drives, particularly in locations involving exposure to grit, dust and moisture.

The two moving parts of the gear run in a bath of oil and it is self-lubricating, requiring no attention beyond inspection of the level in the oil well at long intervals.

The unit does not throw grease or oil.

Safety guards are unnecessary, as the working parts are enclosed.

The efficiency is high, and improves with use.

The drive is smooth and quiet. It is also positive; there is no slippage, regardless of starting torque.

Describe conditions. Ask for Publication W-1132.

**DE LAVAL** WORM GEAR DIVISION of the De Laval Steam Turbine Co., Trenton, N. J.

the flames, keeping the operator at a safe distance from the heat of the fire. Mounted on hard-rubber wheels, the unit is self-balanced—standing or in operation.

•

## Tool Holder

A new adjustable tool holder with a vise grip for use in lathes, shapers and planers is offered by the Robert H. Clark Co., Beverly Hills, Calif. The principle of adjustability makes possible the use of any of four or more sizes of tool bits in the same holder instead of requiring a separate holder for each size. Models available are the 15-deg. sloping cutter channel type and the horizontal or parallel channel type in both right- and left-hand offset. Each type is available in several shank sizes.

In addition, the Clark tool holder has a special vise grip jaw that has a clamping action to hold the bit vertical and horizontal with pressure evenly distributed over the entire holder channel, thus, it is asserted, preventing tool-bit breakage.

•

## Extinguisher Locater

Randolph Laboratories, Inc., 8 East Kinzie St., Chicago 11, Ill., has developed a new fire extinguisher locater sign, a decal water transfer that can be instantly placed above all extinguishers in the plant area. This neatly designed 10-in.-diameter locater, printed in large white letters on a bright red background, is visible for 75 ft. in any part of the plant.

•

## Locomotive Battery

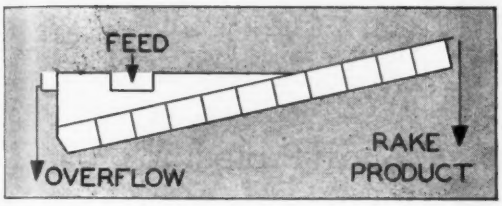
A new mine locomotive and shuttle-car battery said to have 30 percent longer life is offered by the Storage Battery Division of Philco Corp., Trenton, N. J. Named the "Philco Thirty," this battery is stated to incorporate a new principle of fabricated glass-tape insulation which completely incases the positive plates. The tape is wrapped around the plates in a double layer, one horizontal and the other vertical, with ample over lap to assure a homo-

# DORR FINE COAL CLEANING EQUIPMENT

• Recent state laws restricting the pollution of streams have placed the coal producers on the spot relative to the handling of their low grade fine sizes, which they have preferred to discharge to waste rather than recover.

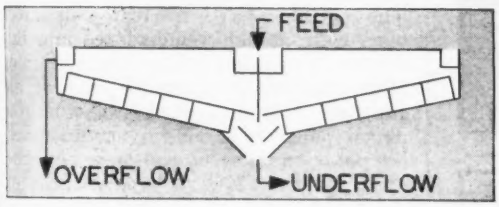
The Dorr Company has had broad experience in the recovery and cleaning of fine coal for which it offers the following equipment. The salvage of salable fuel will largely pay for the cost of treatment.

## DORR RAKE CLASSIFIER



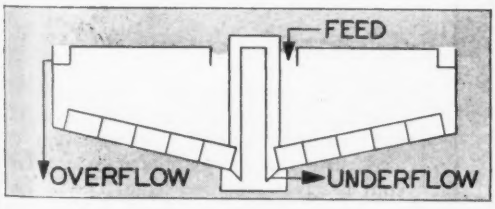

For scalping off coarsest sizes ahead of Thickeners. Delivers a dewatered rake product containing a minimum of fines. Also for dewatering underflow of Thickener or Hydroseparator.

## DORR HYDROSEPARATOR



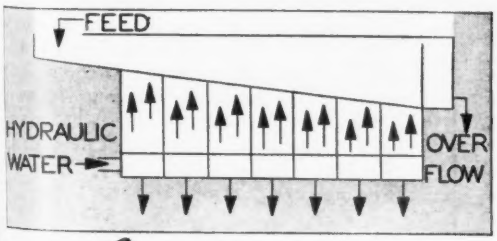

For similar scalping off of coarsest sizes where volume of water to be handled is too great to permit use of rake classifier.

## DORR THICKENER




For separating fine coal from a large volume of water, where it is desired to thoroughly remove the fine settleable solids and permit re-use of water.

## DORRCO SIZER




For separating fine coal under automatically controlled hindered settling conditions, into sharply graded sizes employing the difference in settling rates of particles of varied size and specific gravity. Can also be used for the grading of feed to tables, or flotation.

• Send for a Dorr Engineer to assist you with your stream pollution and fine coal cleaning problems.

DORR

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ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

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When you specify Promet you are assured of a specific formulae designed to best serve each specific requirement and application. Specializing in bronze bearings and bushings for coal mining equipment, we can give a money-back guarantee of superior service with our product.

Parts for Jeffrey, Goodman, Westinghouse, General Electric, Sullivan, Joy Equipment, etc.

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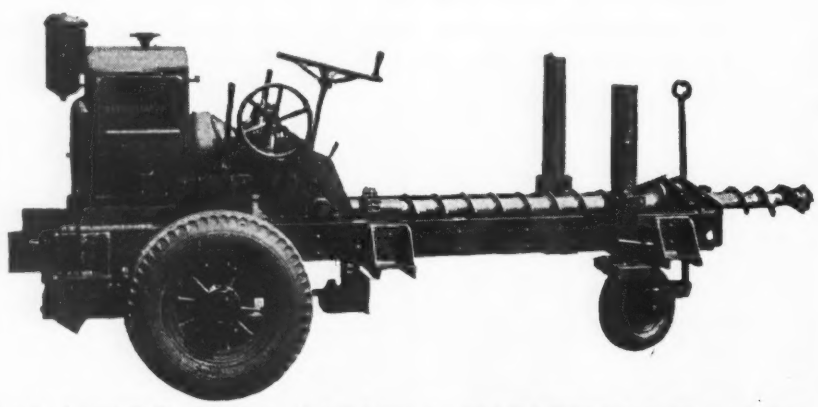
# PARMANCO Horizontal Drills

## *"Positive Control Drilling"*

Parmanco Horizontal Drills give you "Positive Control Drilling." Parmanco Vertical and Horizontal Drills are today's leaders in low cost, low maintenance drilling—All Parmanco Drills are equipped with patented Parmanco augers. Used by leading strip mine operators—Write us your drilling problems.



**PARIS MANUFACTURING CO.**
**PARIS, ILLINOIS**


geneous film. At present this new battery is available in certain sizes and limited quantities. But with the easing of war-time restrictions the line will include types and sizes for all battery-powered mine equipment.

•

## Storage Battery

Electric Storage Battery Co., Philadelphia, offers the Exide-Powerclad battery which supplements the production of Exide-Ironclads to relieve shortages. The result of twelve years of research devoted to developing a specific battery for motive-power requirements, the Powerclad embodies an exclusive design of the positive assembly. It is a plate completely inclosed by a slotted polystyrene retainer. In combination with the separators, it assures effective retention of the active material and provides rapid diffusion of the electrolyte. This, it is said, assures long life and capacity discharges at usable voltages throughout the life of the battery.

•

## Shaft Protector

Keystone Electric Co., 1220-1230 Ridgely St., Baltimore 30, Md., offers the Keystone roller-bearing shaft protector. The device consists of two alloy steel plugs with movable centers fitted into the races of a Timken roller thrust bearing. When inserted between the end of an armature or motor shaft and the stud of a pinion puller it is said to require much less power and prevent damage to both the shaft and the center. A set consists of eight units and three adaptor pieces to handle shafts from 1 to 4 in. in diameter.

•

## Electrode

A new general-purpose electrode for mild steel, designated as "Fleetweld 35" and made specifically for operation on alternating current, is offered by the Lincoln Electric Co., Cleveland, Ohio. This new shielded-arc electrode also will operate on d.c. with either polarity, depending on the type of work being done.

Available in $\frac{1}{8}$-, $\frac{5}{32}$- and $\frac{3}{16}$-in. sizes, "Fleetweld 35" is said to have exceptionally high physical properties, the as-welded weld metal specimens testing as follows: tensile strength, 62,000 to 70,000 p.s.i.; yield strength, 52,000 to 57,000 p.s.i.; ductility (elongation in 2 in.), 23 to 30 percent.

•

## Outdoor Welders

Two new outdoor alternating-current welders, a 500-amp. type and a 300-amp. type, are offered by the Electric Welding Division, General Electric Co., Schenectady, N. Y. The 500-amp. welder has a current range from 100 to 625 amp., while the range of the 300-amp. unit is from 60 to 375 amp. Both are specifically designed for use where exposure to the weather is common.

These welders are equipped with an "idlematic" control which functions to re-

# Haul More in '44

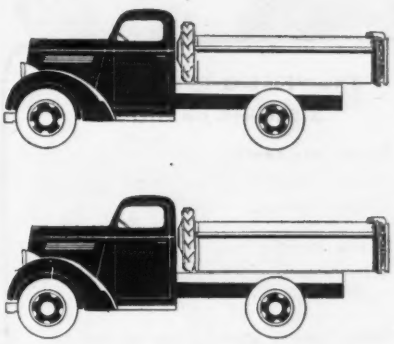
## THE THORNTON WAY

## MAKE YOUR 1½-2 Ton MEDIUM TRUCK DO WORK OF TWO!

**Flash: WPB Has Now Removed All Rationing Restrictions From Third Axle Conversions!**

**THIS**

**1 Heavy Duty Truck**
**1 Driver** (does work of two)
**1 Wage**



**NOT THIS**

**2 Medium Trucks**
**2 Drivers**
**2 Wages**

## THORNTON GIVES 100% MORE TRACTIVE EFFORT...100% MORE PAYLOAD CAPACITY

Whether your business is mining, logging, lumbering, oil production, hauling, construction work, etc., you face the need of more heavy duty trucks. *Where* can you get them? *Here is the solution:* If you own a new or used 1½-2 ton medium, we can convert it into a rugged, powerful, 6-wheel heavy duty truck capable of hauling 100% *more* payload through dirt, sand, mud, snow and up steeper grades.

We can prove savings in manpower . . . investment . . . operation . . . upkeep.

You need this heavy duty conversion. Place your order with Thornton today. Make more money with one truck.

**This is the Thornton Drive, consisting of two driving axles, two-speed gear case assembly, "walking beam" type springs; wheels; tires.**

**THORNTON TANDEM CO.**
8715-D GRINNELL AVENUE • Plaza 9700
DETROIT 13, MICHIGAN, U.S.A.

Investigate **THORNTON** *Automatic-Locking* **DIFFERENTIAL** for Replacement in Truck Axles

In Canada see: **H. V. WELLES, LTD.**, Windsor

**Thornton Tandem Co.**
**8715-D Grinnell Avenue**
**Detroit 13, Michigan, U.S.A.**

Please send me catalog of facts on changing my 1½-2 ton truck into a heavy duty truck.

Name_____
Address_____
City_____ State_____
Make of Truck_____ Year_____
Used for_____

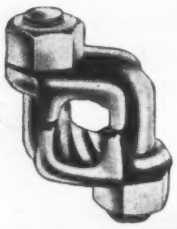
Save Metals... Speed Wire Rope Work.. With a FIST-GRIP

**The "Fist-Grip" Clip Has 3 Strikes on Hitler**

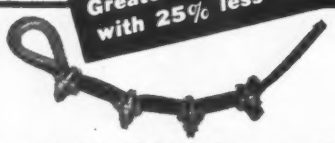
**Saves accidents** — can't be put on wrong; doesn't weaken rope; greater holding power.

**Saves metals** — 25% fewer clips do the job better; no crushed rope ends; flush nuts — no battered threads.

**Save time** — fewer clips to put on; nuts on opposite sides tighten easier, faster with any type wrench.



Greater holding power with 25% less clips!



**"Finger-Pinch".** U-bolt clips unavoidably crimp, distort and bow wire rope, causing reverse strains when load is applied.

**"Fist-Grip".** Fewer Safety Clips hold rope straight in smooth, vise-like grip, with no protruding threads to get battered in use. Clips and rope can always be used on the next job.

Distributed through
Mill, Mine, and Oil Field Supply Houses

FORGING A SHARE IN VICTORY

THE THOMAS LAUGHLIN Company
PORTLAND 6, MAINE

duce the output voltage automatically to less than 30 whenever the arc is not in operation, yet provides full power for welding directly the arc is struck. In addition, this control is provided with a switch, conveniently operated by a handle projecting through the top of the case, for shutting off the welder when not in use. These welders, it is stated, also incorporate all the desirable features of G.E. indoor a.c. welders of this type, including built-in power-factor improvement, finger-tip adjustment, stepless current control and fan-forced ventilation.

•

## Cage Motor Starter

A new magnetic reduced-voltage cage motor starter that protects motors from sustained overloads, locked-rotor condition, single-phasing and overloading from too frequent starting is offered by Allis-Chalmers Mfg. Co., Milwaukee, Wis. This is accomplished in the new starter—called "ARC"—with an accurately calibrated thermal overload relay. Built for general industrial applications, the new starter is now available for control of motors from 5 to 2,500 hp.; up to 5,000 volts, 3-phase, 50 or 60 cycles.

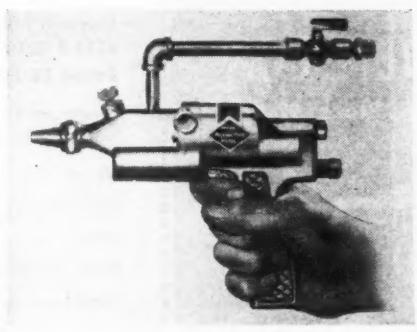
Reduced voltage, two-point starting is obtained with a built-in auto-transformer, utilizing accurate synchronous motor-driven adjustable timing relay for transition from starting to running position. (Units rated through 800 hp. have built-in auto-transformers; above 800 hp., auto-transformers are furnished for separate mounting.) Interrupting capacity rating of the new starter is ten times the motor's full-load current.

•

## Weld Process

Mogul "Nervous Weld" process, a new development of the Metallizing Co. of America, 1330 West Congress St., Chicago 7, Ill., is offered primarily to solve the problem of reclaiming defective aluminum castings and can be used, it is said, with equal success in salvaging bronze, gray iron, malleable and steel castings. Other important uses are the building up of surfaces for press fits, repair of cracked housings, motor blocks and pump housings as well as preparation of surfaces for metallizing.

A complete installation to do this type of repair includes a Mogul "Nervous Weld" pistol, which requires about 60 lb. air pressure at 4 to 5 cu.ft. per minute, and a Mogul "Nervous Weld" machine, 110, 220 or 440 volts, 60- or 25-cycle, single-phase. The latter unit is completely equipped with two 10-ft. lengths of cable, male and female receptacle, pair of goggles, heavy-duty ground clamp, 20-ft. length of air hose complete with fittings, wall receptacle and complete instructions.



The pistol deposits atomized particles of metal which are welded to the surface and pressed, leaving a metal which is welded and forged. Designed for manual operation, the rod (aluminum, bronze or nickel) is fed through the pistol by a trigger control and it is possible to feed $\frac{1}{8}$- to $\frac{3}{8}$-in. with one stroke of the finger-grip trigger.


HERCULES AUGERS

**Hercules Augers**

Ideal for modern high speed electric drills—with stands whips and torsional strains. Flint hard and tough as whalebone. Drills faster—drills more holes with resharpening—outlasts four to five ordinary drills. Recommended for the hardest jobs. Up to 3" diameters—up to 16 ft. in length.

**Black Diamond Augers**

Carefully made from high-carbon crucible grade steel—heat-treated to obtain as much hardness and toughness as possible, to prevent broken tangs and points. Furnished up to 2" diameters—maximum over-all lengths 16 ft.

**Standard Augers**

Originally developed for use with hand drills. These augers work best at hand drilling drilling holes under stumps, and ditch blasting. Up to 2" diameters from oval steel, 7/16" thick, and maximum length of ten ft.

Call on us for any type auger you may require in your operations. We specialize in manufacturing the better grade alloy, heat-treated augers. Write, wire or 'phone for details concerning sizes, prices, deliveries, etc.

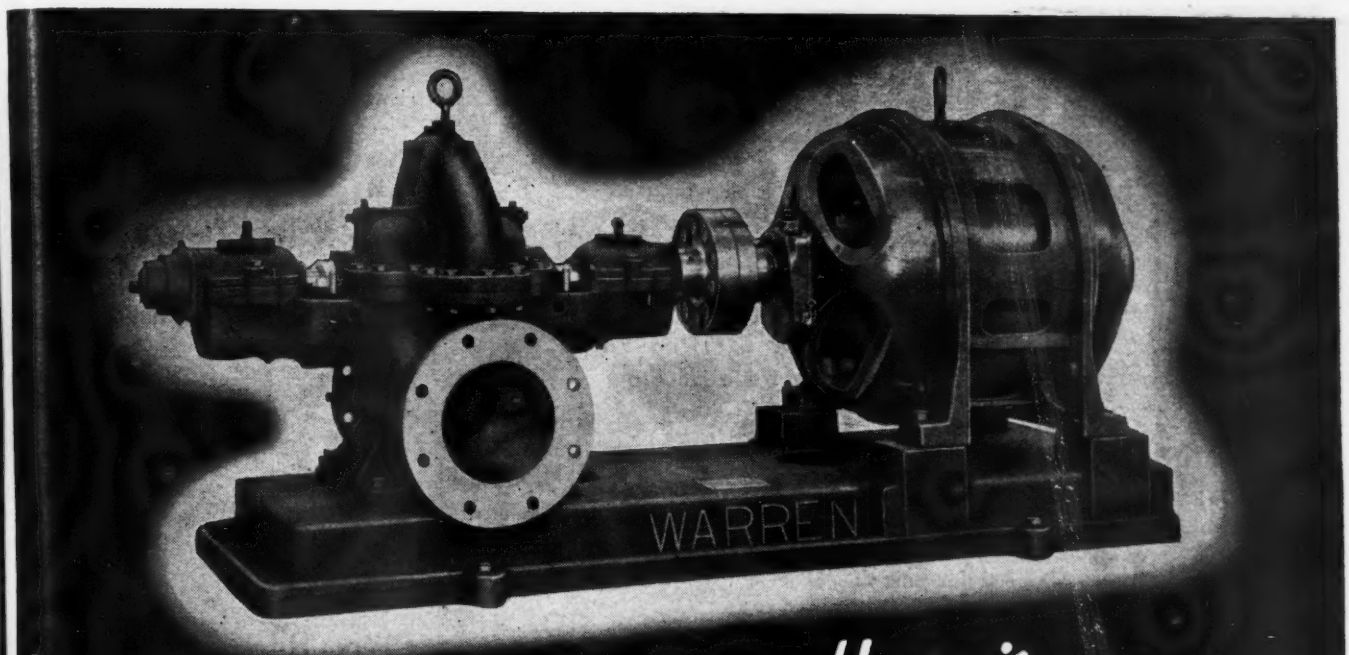
SALEM TOOL COMPANY
SALEM OHIO


## All-Plastic Goggles

New all-plastic goggles, "Looks," are offered by Mine Safety Appliances Co., Pittsburgh 8, Pa. Featuring light weight, wide vision and comfort, they are suitable for both men and women and provide comfortable, durable protection for the eyes, according to M.S.A.

Designed with individual eye cups molded to fit the facial contours, Looks goggles provide a close yet comfortable seal around the eye orbits. Large aviation-type lenses afford a wide, unobstructed angle of vision.

The strong, clear plastic frame is available in two styles: the general-purpose model, providing direct ventilation through holes at the top and bottom of the eye cups, and the dust model, with indirect ventilation through serrated lens seats. All lenses are of polished sheet acetate, clear




*Here's a*

# WARREN PUMP

## TO THINK ABOUT WHEN YOU THINK ABOUT

# THE FUTURE

## SINGLE STAGE • DOUBLE SUCTION • TYPES DM and DL

*Check these features:*

CASING: Pump casing is of the double suction, volute type divided on the horizontal center-line. Suction and discharge nozzles are cast integral with lower half. Bearing brackets on smaller sizes are cast integral with lower half of pump casing. On larger sizes brackets are securely bolted and dowelled to the pump casing. Water passages are designed to produce smooth flow with gradual changes in velocity. By removing case cover and bearing caps, the entire rotating member may be removed for inspection or repair without disturbing pipe connections.

IMPELLER: The impeller is of the enclosed type, accurately machined and balanced to insure freedom from vibration. All water passages are hand filed and renewable impeller rings are standard equipment.

SHAFT: Shafts are machined and finished by grinding to accurate dimensions and are of ample diameter to safely transmit the required power without undue bending or twisting.

CASE RINGS: Case rings are securely held in place by means of a tongue and groove lock in the lower half of the pump casing. This construction maintains parallel clearance spaces between impeller and case rings and secures case rings against rotation and lateral movement.

BEARINGS, RADIAL: Bearings are of the split type, ring oiled, lined with genuine babbitt, bolted together and held in place by the bearing cap which also locks bearings against rotation. Bearings may be replaced without disturbing the rotor.

BEARING THRUST: All pumps are fitted with a ball thrust bearing of the double row angular contact type, designed to take thrust in either direction.

PACKING GLANDS: Packing glands are of the split type, bolted together and can be removed without disturbing other parts.

TESTING: Every Warren pump is given a running test and all guarantees verified before shipment. Each casing is subjected to a hydrostatic test pressure at least 50% in excess of the operating pressure.

*FOR COMPLETE SPECIFICATIONS* ARMY NAVY *AND RATINGS ASK FOR BULLETIN 227-1*

# WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

There's a
BRANFORD PNEUMATIC VIBRATOR for EVERY SPOT!

PIGMY
3/8" PISTON DIA.

GIANT
8" DIAMETER PISTON

WHERE CLOGGING OCCURS
in Pipes; Hoppers, Bins, Chutes, etc.

*Quick Acting Starting Valve*
*Controls Rate of Flow*

*Write—State Problems*

Send plan of equipment — Specifications — Tonnage handled — Wet or dry materials — Size of material — Ask for Bulletin "E".

NEW HAVEN VIBRATOR CO.
150 Chestnut St.
NEW HAVEN 7, CONN.

HOPPERS — CHUTES — PIPES — BINS

PUT A BRANFORD AT THE SPOT WHERE IT'S NEEDED

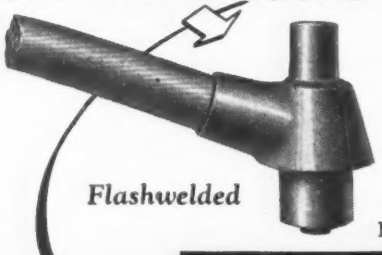
**The Searchlight Section of Coal Age**

features Employment, Equipment and Business Opportunities identified with the mining of coal.

"Searchlight" ads are referred to regularly by readers interested in such "Opportunities."

You can therefore bring "Opportunities" you have to offer to the attention of these readers quickly, and at small cost, through an advertisement in the Searchlight Section.
(See pages 170-175)

*the* M16-F ROUND WEDGE TYPE RAIL BOND...




- Easy to Apply
- Full Copper Contact to Rail
- Easy to Recover and Reuse
- No Loose Pieces

Write for
MOSEBACH Catalog No. 44

MOSEBACH ELECTRIC & SUPPLY COMPANY
1115 Arlington Avenue . . . Pittsburgh 3, Penna.

or green in color, and are quickly and inexpensively replaced. A wide elastic headband holds the goggle in place at low tension, assuring wearing ease over a long period of time. Further details are available in Bulletin CE-25.

•

## Zinc Die Castings

Zinc-base die castings, normally difficult to repair, can be easily and effectively reclaimed, it is said, with the improved gas welding rod, 195, now marketed by the Eutectic Welding Alloy Co., 90 Worth St., New York 13, N. Y. The new rod has a lower melting point and a still lower bonding temperature than the original alloy, which make it easy to apply without danger of damaging the parent metal. The improved rod also is easy to build up with, has great tensile strength and matches the hardness of the die castings.

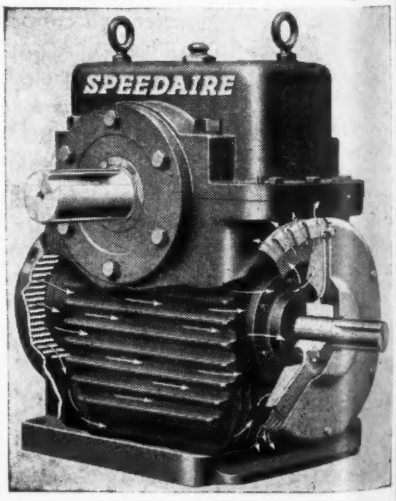
•

## Gear Reduction Unit

Newly announced by Cleveland Worm & Gear Co., Cleveland, Ohio, is the Speedaire worm gear-reduction unit, incorporating a fan-cooling system which permits a pronounced reduction in size of the unit required for a given horsepower output. The basis of the cooling system is a new type of double wall construction providing an air passage completely enveloping the oil reservoir in which the gear operates. Deeply finned on the air side, the inner housing wall forming the reservoir markedly increases the heat-dissipating surface.

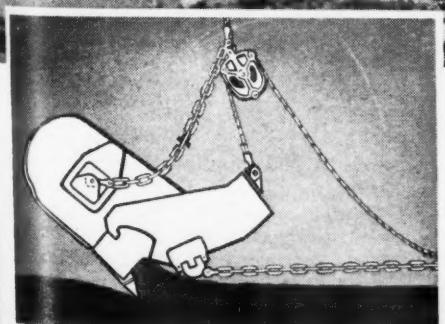
An exhaust fan located on the coupling end of the worm shaft draws air at high velocity through the space between the housing walls from a grille at the opposite end of the unit. This fan is designed to operate with either direction of rotation. The effect of the double-wall construction is to maintain a uniform flow of cooling air against the fins and housing wall over the whole oil reservoir surface, and thus completely to utilize the full heat-transfer efficiency of the system.

The operating temperature is greatly lowered by means of this high-velocity air stream enveloping the oil reservoir, giving the Speedaire unit great load-carrying capacity.



# READY... SET... DIG

ALWAYS LANDS IN DIGGING POSITION | ALL THE BUCKET WEIGHT IS ON THE TEETH | BITES IN AT THE FIRST PULL OF THE LOAD LINE



**DIGS IN AT THE FIRST PULL**

Regardless of the depth of the pit, a Page "Automatic" bites right in and gets a full-load FAST!

● You bet you can move dirt faster with a Page AUTOMATIC Bucket on YOUR DRAGLINE. Why? Because it "Automatically" lands in ready-to-dig position at any depth. An "AUTOMATIC" Bucket (1) strikes on its forward arch (2) Rotates back onto its teeth and arch (3) At the first pull of the load line all bucket weight is on the teeth gouging out a full pay load! ONLY a Page Bucket gives you this "AUTOMATIC" Digging Action.

**PAGE ENGINEERING CO., CHICAGO 38, ILLINOIS**

**PAGE**

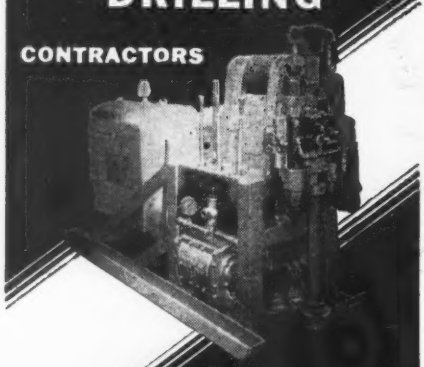
*Automatic* **DRAGLINE BUCKETS**

Send a
V-MAIL today
Keep up morale

Home front news is vital on the fighting front. Write a fighting man today.

Hotel Mayfair
SAINT LOUIS
Air-conditioned Noiseproofed

MOTT
DIAMOND CORE DRILLING
CONTRACTORS



Mott Type "A" Oil Hydraulic 1500 Ft. Cap., 2¾" Diameter Core.

● Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs . . . guarantee satisfactory and proper cores.

Pre-pressure grouting for mine shafts, ground solidification for wet mine areas by our stop grout method. Water wells and discharge holes drilled and grouted . . . electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

# Industrial Notes

INSLEY MFG. CORP., Indianapolis, Ind., has appointed George J. Dimond as sales manager, vice Ray W. Dorward, retired.

RELIANCE ELECTRIC & ENGINEERING Co., Cleveland, has established a sales promotion department headed by Roscoe H. Smith, who has been manager of applied engineering, assisted by Kenneth F. Ertell, who has been named assistant advertising manager. Under the enlarged set-up, C. V. Putnam relinquishes his duties as advertising manager to Mr. Smith but will continue his executive responsibilities as secretary of the company. Richard A. Geuder, who has been manager of metal industry applications, will assume Mr. Smith's previous responsibilities as manager of applied engineering, without, however, abandoning altogether his specialization in motor-drive problems of the metal industry. He will be assisted by John L. Van Nort, until recently sales and application engineer for Reliance in Salt Lake City, and William C. Madsen, who has been on the company's application engineering staff for the last three years.

E. E. LEVAN has been elected president of Haynes Stellite Co., a unit of Union Carbon & Carbide Corp., succeeding the late Francis P. Gormely. Mr. LeVan entered the employ of Haynes Stellite Co. as a sales engineer in 1922. He will continue to make his headquarters in Kokomo, Ind., where the Haynes general offices and plant are located.

PHILLIPS MINE & MILL SUPPLY CO., Pittsburgh, Pa., has been appointed district sales representative for the Hyster Lift Truck Co., Portland, Ore., and Peoria, Ill.

TRUMBULL ELECTRIC MFG. CO., Plainville, Conn., has appointed Arthur (Art) H. Soper as field representative in the Philadelphia district, assisting Frank M. Oglee, manager.

WALTER P. HALLSTEIN JR., who started with the Goodyear Tire & Rubber Co., Akron, Ohio, in 1934 as a member of its Flying Squadron, has been appointed assistant manager of the belt sales department.

R. G. WINGERTER, for the last six years an industrial engineer for the Timken Roller Bearing Co., Canton, Ohio, has been appointed assistant chief engineer for the industrial division.

FRANK C. ANGLE, manager of Allis-Chalmers sales activities in the Pacific region, has been appointed manager of all A.-C. field sales offices of the general machinery division and their operations. He will continue to supervise operations of the Pacific region.

E. I. DUPONT DE NEMOURS & Co., Wilmington, Del., has elected Edward B. Yancey a vice president and member of the executive committee. Since 1935 he has been general manager of the explosives department and since 1938 a member of the board of directors. William H. Ward succeeds Mr. Yancey as general manager of the explosives department. He has been assistant general manager since 1935, when Mr. Yancey became head of the department. H. F. Brown, general superintendent of the department since April 1, 1943, succeeds Mr. Ward as assistant general manager. P. J. Kimball, manager of the explosives division for nearly four years, becomes general superintendent. F. R. Wilson moves up from director of production of high explosives to manager of the explosives division. J. H. Wellford, who was general assistant to management in the explosives department, will be associated with Mr. Yancey.

COAL MINE EQUIPMENT SALES Co., Terre Haute, Ind., has purchased a large tract of land in that city from the New York Central R.R. and will erect a 50x150-ft. steel and brick building with a new 15-ton electric traveling crane and railroad track running through the width of the building. To be installed are late-type machine-shop equipment for rebuilding locomotives, cutting and loading machines and various used mine equipment.

EIMCO CORP., Salt Lake City, Utah, has opened a new branch office in the Paul Brown Building, St. Louis, under the management of James K. Russell.

I-T-E CIRCUIT BREAKER CO., 19th and Hamilton Sts., Philadelphia, has appointed Harry L. Buck as assistant to the president, W. M. Scott Jr. Mr. Buck formerly was marine application engineer of the company.

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# Trade Literature

ELECTRODES—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B6340 describes a new line of smooth-flowing arc-welding electrodes with quiet arc characteristics. The new electrodes, both a.c. and d.c. types, use the standard American Welding Society number and color, simplifying selection and handling. The new bulletin includes a price sheet, zone classifications, freight policy, quantity discounts and term explanation.

V-BELT DRIVE EQUIPMENT—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B6331 describes each of the various V-belts, sheaves and drives in what A.-C. describes as the widest and most accurately calibrated line of V-belt drive equipment ever developed. Five special kinds of Texrope V-belts—each designed for a specific type of protection—are reviewed: Heat-Resisting Super-7, Oil-Resisting Super-7, Oil-Proof Super-7, Static-Resisting Super-7 and Super-7 steel belt. The new type Magic-Grip sheave and the four speed-changing method used in Allis-Chalmers sheaves also are described.

MINE BLOWERS—Jeffrey Mfg. Co., Columbus 16, Ohio. Bulletin 783 describes and pictures the Aerodyne Midget blower, Type 61 blower, universal blowers and exhausters, Aerodyne Junior fan, Type 8L Aerodyne Junior fan and Types 8H and 8M Aerodyne mine fans with adjustable blades.

PNEUMATIC MATERIALS HANDLING—

# Proved in ACTION!

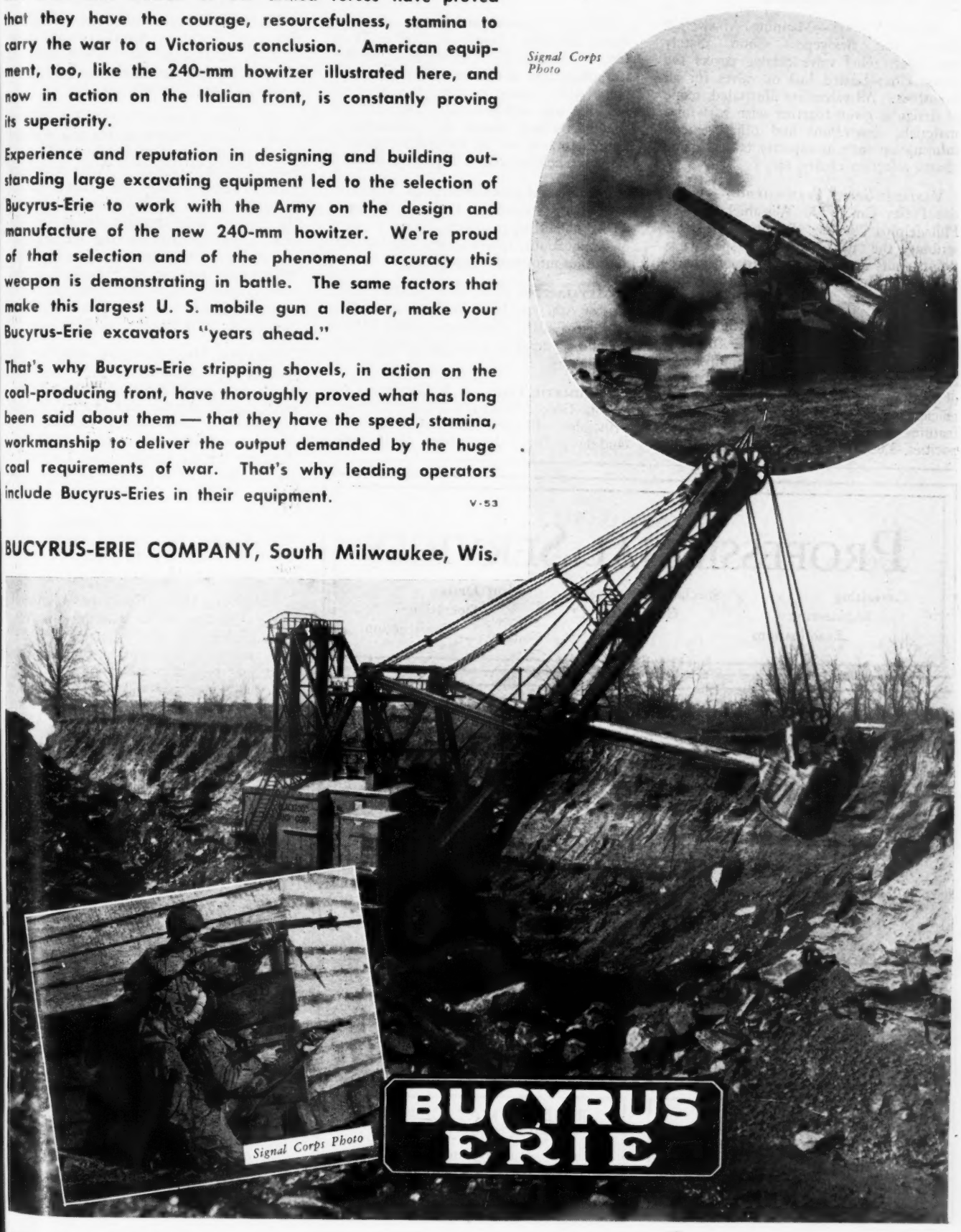
**The men and women of our armed forces have proved that they have the courage, resourcefulness, stamina to carry the war to a Victorious conclusion. American equipment, too, like the 240-mm howitzer illustrated here, and now in action on the Italian front, is constantly proving its superiority.**

**Experience and reputation in designing and building outstanding large excavating equipment led to the selection of Bucyrus-Erie to work with the Army on the design and manufacture of the new 240-mm howitzer. We're proud of that selection and of the phenomenal accuracy this weapon is demonstrating in battle. The same factors that make this largest U. S. mobile gun a leader, make your Bucyrus-Erie excavators "years ahead."**

**That's why Bucyrus-Erie stripping shovels, in action on the coal-producing front, have thoroughly proved what has long been said about them — that they have the speed, stamina, workmanship to deliver the output demanded by the huge coal requirements of war. That's why leading operators include Bucyrus-Eries in their equipment.**

V-53

*Signal Corps Photo*



*Signal Corps Photo*

**BUCYRUS-ERIE COMPANY, South Milwaukee, Wis.**

BUCYRUS ERIE

Allen-Sherman-Hoff Co., 231 South 15th St., Philadelphia 2, Pa. Bulletin 744 tells "the facts about pneumatic materials handling in industry," emphasing the advantages of the "Hydrovacter" unit, a multi-jet hydraulic air pump, which is able to recirculate the water used for producing a vacuum—a decided benefit where water is scarce or expensive.

SAFETY VALVES—Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Safety and safety relief valve catalog covers the entire Consolidated line of valves for all industries. All valves are illustrated, scope of design is given together with parts and materials, dimensions and other general information such as capacity tables, sizing charts, selection charts, etc.

VARIABLE-SPEED TRANSMISSION—American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa. Bulletin SJ-44, describing the new American speed-jack, points out exclusive features of speed-jack drives and provides specifications and installation data.

PUMPS—Chain Belt Co., 1600 West Bruce St., Milwaukee 4, Wis. Bulletin 447, on Rex speed prime pumps, describes them as applicable to many types of pumping work because of compactness, efficient operation and positive self-priming feature. Sizes range from 1½ to 8 in.; capacities, 3,000 to 125,000 gal. per hour.

EARTH MOVERS—Euclid Road Machinery Co., Cleveland, Ohio. Bulletin Form J-200, "Bottom-Dump Euclids on the Move," details the growth of these units in the last decade, particularly in the field of strip mining, giving as proved features versatility, speed and capacity, fast turning, quick dumping and economical operation.

METAL CONVEYOR BELTS—Cyclone Fence Division, American Steel & Wire Co., Waukegan, Ill. Catalog No. 3 recites the advantages of Cyclone metal conveyor belts, which come in three types: chain link, flat wire and flex-grid. They are not affected by heat, steam, water, changes in temperature or any of the usual causes of conveyor belt trouble, it is pointed out.

LIFTING MAGNETS—Stearns Magnetic Mfg. Co., Milwaukee 4, Wis. Bulletin 35-A, on lifting magnets, contains data on applications, specifications, illustrations and other informative material.

METALLIZING EQUIPMENT—Metallizing Co. of America, 1330 West Congress St., Chicago 7, Ill. Catalog describes Mogul metallizing equipment, giving specifications and prices.

PNEUMATIC TIRES—B. F. Goodrich Co., Akron, Ohio. Manual discusses the basic principles of pneumatic-tire design, including pictured descriptions of the role played by each part of the tire in its operation and how tires are manufactured. Measurements and other data on each of the important classifications of heavy-duty military and civilian tires, and proposed load and inflation table for them are among the features of the publication, together with tube, valve, flap and rim data.

RUST PREVENTIVE—Valvoline Oil Co., 449 Culvert St., Cincinnati, Ohio. Bulletin describes Tectyl, a metal-cleaning, rust-resisting lubricating oil. Chart outlines characteristics of five grades for protection against salt water, weathering, etc.

WELDING—Lincoln Electric Co., Cleveland, Ohio. Booklet describes new method for increasing speed of welding mild steel called "Fleet-Welding." Ways in which Fleet-Welding utilizes the benefits of arc force to obtain greater penetration and the required weld strength also is brought out. Other subjects covered include factors affecting production speed and general information for use of procedure tables and complete information, with corrective suggestions, on the procedures used for butt welds, fillet and lap welds.

ELECTRIC UNIT HEATERS—Electric Air Heater Co., Mishakawa, Ind. Bulletin 44-U illustrates and describes the Electromode line of electric unit heaters, including standard sizes ranging from 1.5 to 60 kw. for ceiling, wall or post suspension, although the six smaller sizes, 1.5 to 7.5 kw., are described as portable or suspension types.

AIR COMPRESSORS—Schramm, Inc., West Chester, Pa. Bulletin covers portable and stationary air compressors for every mining need.

FLAT-BELT DRIVE EQUIPMENT—American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa. Catalog FBD-44 gives complete information on American steel split pulleys and bushings, shaft collars, shaft hangers and bearings, split and solid conveyor pulleys, Hi-Torque motor pulleys, belting and Econ-o-matic drives for short-center flat-belt drives. Application, design and advantages of group drives also are discussed.

POWER—Preferred Utilities Mfg. Corp., 1680 Broadway, New York 23, N. Y. Service booklet, "Dividends From Your Power Plant," is published as a service to power-plant engineers and executives, to help them to a better understanding of steam-producing problems, as well as appreciation of the plant engineer and his job. Booklet consists of a compilation of ten non-technical discussions by authorities on steam generating. Each article handles a different phase of power-plant operation and supplies useful information. It discusses steam-producing equipment, modern installation and practice, operating economies, boiler efficiencies, potential heat vs. produced steam and other such pertinent subjects.

TIRE CARE—B. F. Goodrich Co., Akron, Ohio. Wall poster gives seven rules for tire care: Don't overload; don't exceed victory speed; don't overinflate; don't underinflate; duals must be twins; drive carefully; correct mechanical defects.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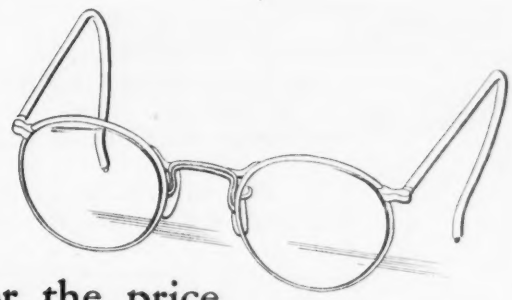
**READERS MAY CONTACT THE CONSULTANTS**
*whose cards appear on this page* with the confidence justified by the offering of these special services nationally.

**1** You can lose up to 20 tons *a day every time an eye accident lays a man off.*

**2** And you lose on medical bills

*. . . and compensation if it turns out to be a serious injury.*



**3** For the price of one eye accident you can buy many an AO Safety Goggle

*. . . goggles that would have prevented the accident . . . and kept the miner producing . . . for himself and for you.*

**4** Call an MSA MAN to demonstrate

*. . . how the AO line offers complete eye protection for every hazardous job in your company.*

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

# BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND ILLINOIS

# FINANCIAL STATEMENT

JUNE 30, 1944

## ASSETS

| | | |
|---|---|---|
| BONDS (Amortized Values): | | |
| United States Government | $9,066,880.95* | |
| Political Subdivisions of States | 63,892.72 | |
| Railroad | 75,998.03 | |
| Industrial | 27,900.83 | |
| TOTAL BONDS | | $ 9,234,672.53** |
| STOCKS (Market Values): | | |
| Preferred—Railroad, Public Utility, Industrial and Miscellaneous | $281,717.26 | |
| Common—Public Utility and Industrial | 382,987.50 | |
| TOTAL STOCKS | | 664,704.76 |
| Investment in Bituminous Fire and Marine Insurance Company | | 350,000.00 |
| Cash | | 1,241,877.15 |
| Premiums in Course of Collection less than 90 days due | | 752,131.99 |
| Accrued Interest on Bonds | | 31,247.75 |
| Other Assets | | 3,904.90 |
| TOTAL ADMITTED ASSETS | | $12,278,539.08 |

## LIABILITIES

| | | |
|---|---|---|
| Reserve for Claims | | $ 6,496,955.27 |
| Reserve for Unearned Premiums: | | |
| 100% Advance Deposits (Guarantee for Payment of Interim Earned Premiums) | $1,610,971.25 | |
| Unearned Portion of Annual Payment Basis Premiums | 919,603.03 | |
| TOTAL UNEARNED PREMIUMS | | 2,530,574.28 |
| Reserve for Unpaid Dividends | | 60,251.91 |
| Reserve for Taxes and Reinsurance | | 219,974.74 |
| Reserve for Commissions and Other Expenses | | 507,183.98 |
| Other Liabilities | | 8,287.48 |
| Reserve for Fluctuation in Market Value of Securities Owned (Excess of Market Value over Book Value of Stocks Owned) | | 76,474.77 |
| TOTAL LIABILITIES | | $ 9,899,702.43 |
| Capital | $1,000,000.00 | |
| Surplus | 1,000,000.00 | |
| Voluntary Contingency Reserve | 378,836.65 | |
| SURPLUS AS REGARDS POLICYHOLDERS | | 2,378,836.65 |
| TOTAL LIABILITIES, CAPITAL AND SURPLUS | | $12,278,539.08 |

* United States Government Bonds carried at $372,402.89 in the above statement are deposited as required by law.

** Market Value of bonds $142,983.57 is excess of above amortized value.

United States Government Bonds and Cash represent more than 83% of the Total Admitted Assets.

# MORE STRENGTH
## TO RESIST THRUST STRESS
## . . . Plus Lower Starting Torque

WITH

# ROLLWAY
## *Right-Angle-Loaded*
## THRUST BEARINGS

Even relatively minor thrust stresses—if applied to a bearing carrying a radial load—are liable to cause premature failure, excessive wear on the race, or permanent deformation of the housing. That's why Rollway's pure-thrust roller bearings—with their greater strength to resist thrust stresses—are important wherever thrust loads are encountered. They give you:

**1.** Right-angled loading that prevents radial loads from piling up on the thrust bearing.

**2.** From 3 to 5 times the carrying capacity of an equal-size ball bearing.

**3.** Complete freedom from wedging or pinching-out of rollers, hence *l*ess end-rub, *l*ess sliding friction, and *l*ess roller-end wear back.

**4.** Long, line contact that is markedly free from brinelling under heavy oscillating or static loads.

**5.** Low starting torque even where an oil film is not maintained.

RADIAL
THRUST
Follow This Basic Bearing Principle:—
● All radial loads carried at right angles to the roller axis.
● All thrust loads carried at right angles to the roller axis.
● All compound loads carried on separate radial and thrust bearings — used in combination — as shown in the diagram.

### ENGINEERED TO THE JOB!

Rollway bearings may resemble one another in type and series, yet each is built for a specific purpose. Be sure you get the specialized suitability you need. Send us a sketch, drawing or detailed description for free, confidential bearing analysis and recommendation. No charge or obligation.

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BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

**WORLD'S LARGEST PRODUCER OF CYLINDRICAL ROLLER THRUST BEARINGS**

# DUSTLESS COAL MAKES FRIENDS

## CALCIUM CHLORIDE MAKES COAL DUSTLESS!

A load of dusty coal will lose friends and customers, but you can be sure of making friends with coal made dustless at the mines with calcium chloride.

Proper Dustproofing now, when so many suppliers are indifferent, will pay off with a long line of customers who will stay with coal because they like it.

Calcium chloride has been used for years by many of the leading mines, for dust-proofing and freezeproofing coal. They have found it effective and economical and have pleased thousands of users with their dustless coal. Our Bulletin No. 37, "Dust-proofing and Freezeproofing Coal," tells how to insure customer satisfaction. The bulletin will be sent on request.

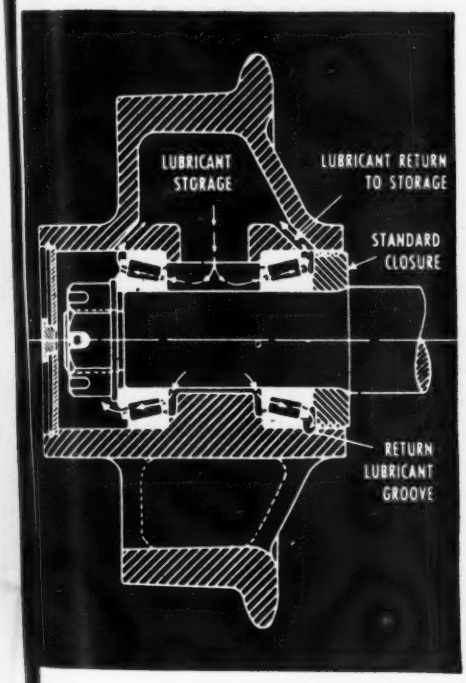
**CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Building, Detroit 26, Mich.**

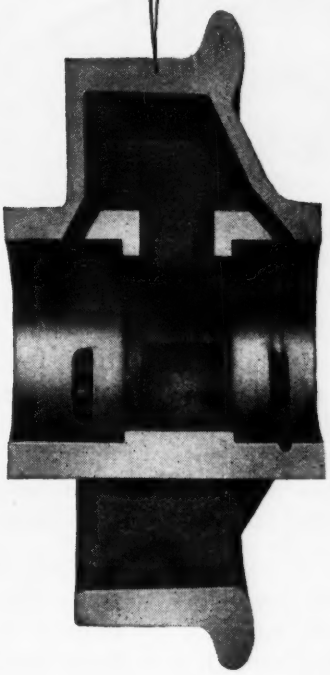
**DUSTPROOF COAL AT THE MINES WITH**

# CALCIUM CHLORIDE

# Like a ROBOT RE-OILER

## that requires no attention for several years



*The wheel with the built-in lubricating system*

ONE OILING . . . and no more attention for *several years!* The "Oilspok" Wheel takes care of its own lubricating, automatically. Every time the "Oilspok" Wheel starts turning the lubricant starts flowing—positive and continuous, giving the bearings longer life, keeping them cool and clean and always like new, and assuring free-turning wheels under all weather conditions. 5000 to 6000 miles on one lubrication.

The oil in the reservoir spokes of "Oilspok Wheels" is sealed in, yet gives constant lubrication to bearings. No loss due to pumping action of bearings or to air expansion. No loss of bearing parts.

"Oilspok" Wheels can be furnished for all mine car bearing sizes in diameters from 10 inches to 20 inches. They are made with both standard and labyrinth enclosures, and for plain or roller bearings. Any type oiler or oil plug can be furnished or used.

Save maintenance costs . . . make sure of uninterrupted, long-life car wheel service. Use "Oilspok" Car Wheels. Write for full information.—HOCKENSMITH WHEEL & MINE CAR COMPANY, *Established 1877, Penn, Pa., Phone—Jeannette 700.*

### "OILSPOK" WHEELS WILL—

**1. Increase Wheel Life.** Excessive tread wear—caused by the churning resistance of heavy greases—is eliminated. Free wheel rotation.

**2. Save Power.** Free wheel rotation means no power lost by churning grease. The lubricant in the "Oilspok" wheel is fluid and free flowing.

**3. Save Lubricant and Lubricating Labor.** "Oilspok" lubrication is positive and continuous—no loss due to bearing pumping pressure or air expansion. One greasing lasts several years—less labor cost and loss of car service.

**4. Give Longer Bearing Life.** Bearing lubricant is constantly changed—bearings clean and cool—constant circulation maintains lubricant in better condition.

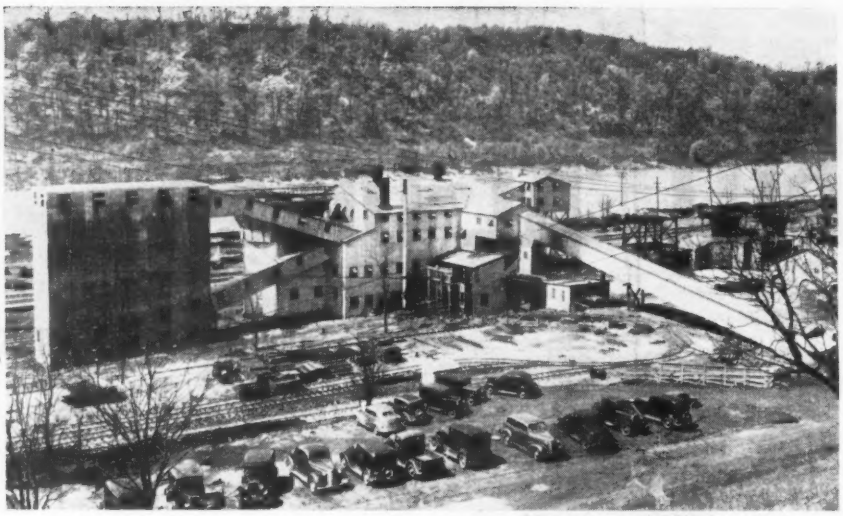
**5. Increase Axle Box Life.** "Oilspok" wheels are free turning under all temperature conditions—no chance of axles turning in dry boxes.

**6. Eliminate Disadvantage of Small Diameter Wheels.** Higher hub resistance—a characteristic of small diameter wheels with large bearings—is substantially reduced in "Oilspok" wheels with their positive, circulating fluid lubrication.

**7. Provide Stronger Wheel—No Extra Weight.** "Oilspok" wheels have tapered box-section spokes—the strongest possible construction for resisting side thrust and vertical loads. Same weight as standard wheels for various bearing and axle sizes.

## Hockensmith *"Oilspok"* Wheels

# Screening Dependability



## — you get it in BIXBY-ZIMMER SCREENS

*. Weirton Coal Company at Isabella, Pennsylvania operate Bee-Zee Screens in their plant.*

The nation's coal industry is working full speed to produce war-essential coal. Mining tools and equipment are being subjected to longer hours and bigger loads than ever before. Bixby-Zimmer Preparation Screens are dependably standing up under wartime pressure in leading mines in every coal field.

It's easy to see why, if you're familiar with their sturdy, wear-resistant, round-rod construction. They are built with round-rods, firmly welded to their frames. These rods are manufactured of extremely hard alloys which resist wear and abrasion, assuring longer life and less waste in production.

The round-rod design of Bixby-Zimmer Screens helps maintain high coal production for longer periods of time, because openings between the rods are accurately retained as originally built. The size of opening cannot decrease until the round rods have worn away below their centerline diameters.

Bixby-Zimmer Screens are custom-built for every type of coal preparation equipment — Chute and Conveyor Screens, Heat Dryer Screens, Rigid Panel Vibrator Screens, Sizing Screens, Centrifugal Dryer Screens, and Shaker Panel Screens.

You are cordially invited to call on our trained engineers for recommendations on money-saving screens for your plant. Call or write us today for further information.

BEE ZEE

**THE HIGH QUALITY MARK IN COAL PREPARATION SCREENS** ★

# BIXBY-ZIMMER

**ENGINEERING CO.**

**961 ABINGDON ST. GALESBURG, ILL.**

# WHAT'S THE ANSWER?

Never before have so many questions faced the American people as they do today. No wonder that perplexity is the common expression to be found wherever you go.

War . . . its very nature being that of destruction . . . disrupts the normal, sane way of living. Happily, recent events are causing the pendulum to take a gigantic swing toward the cause of the Allies, registering a tremendous increase since Pearl Harbor.

This very fact brings up many questions. Business men, especially those engaged in the Coal Mining Industry, want to know about their source of supply in the post-war period.

As far as Industrial Rubber Goods are concerned, QUAKER, with 59 years of successful operation, is the logical answer.

Quaker's factory and management are devoted exclusively to the many products of Industrial Rubber Goods. Everyone at Quaker, from the chief executive to all employees, are all Industrial Rubber minded . . . no other product comes across our path to detract from our set purpose of producing this type of Quality merchandise.

Progressive Quaker offers outstanding qualifications that merit your consideration:

**FINANCIAL**—Quaker enjoys highest commercial rating.

**PRODUCTION**—Quaker, by thoughtful scheduling, with proper manufacturing supervision, enables increased tonnage each year.

**TECHNICAL ASSISTANCE**—Quaker's Sales Organization includes technical experts who are at your Service to assist you on any problems you may have regarding Belting, Hose or Packings.

**DISTRIBUTION**—Quaker enjoys national distribution of its products.

Keep Quaker in mind when you need a Conveyor or Transmission Belt; Hose for any purpose; Rod and Sheet Packings. Give Quaker serious consideration on all your Industrial Rubber Products.

***"If there is a way to get it done—Quaker will do it!"***

## QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA.

New York 7 • Cleveland 15 • Chicago 16 • Houston 1

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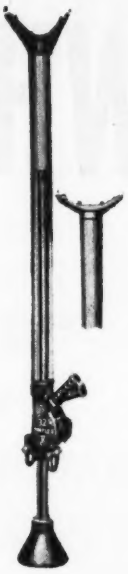
**QUAKER PACIFIC RUBBER CO.**

SAN FRANCISCO 5 LOS ANGELES 21

*Cross-Timbering at Lower Cost— with Greater Safety!*

Screw type, 5 and 7-tons capacity.



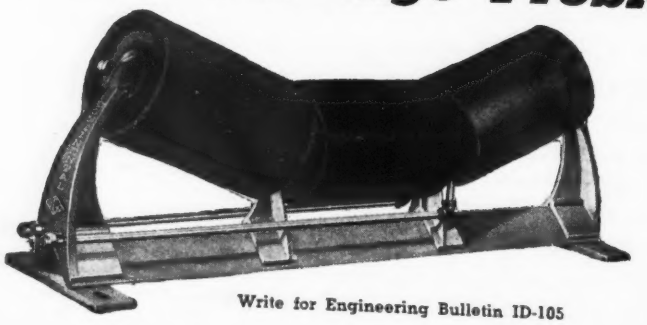
Ratchet lever type, 5-tons capacity.

Simplex Mine Timber Jacks save many man-hours in cross-timbering by quickly raising beams—wood or steel—and holding them safely in place until Simplex Adjustable Roof Supports or posts are spotted. Three models—screw, ratchet lever, and double acting automatic lowering. Ratchet lever type is also a powerful puller. Ask for new Catalog 44.

**Simplex**
LEVER - SCREW - HYDRAULIC
**Jacks**

Templeton, Kenly & Co., Chicago (44), Ill.
*Better, Safer Jacks Since 1899*

*Continental* **IDLERS**
***Solve Your Haulage Problems***

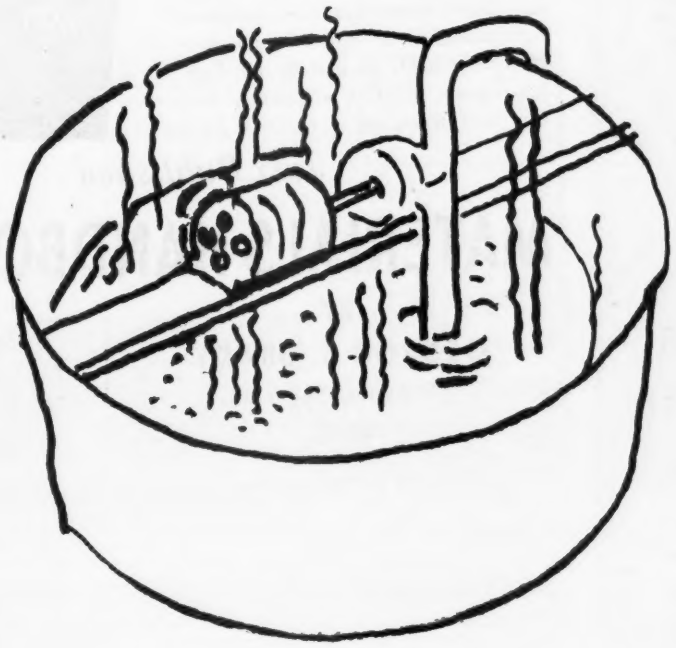


Write for Engineering Bulletin ID-105

INDUSTRIAL DIVISION
**CONTINENTAL GIN COMPANY**
BIRMINGHAM, ALABAMA
ATLANTA • DALLAS • MEMPHIS

A FIBERGLAS* CASE HISTORY

# MOTOR NOW RUNS MONTHS IN 250° F. AMBIENT TEMPERATURE



Averaged only 2 weeks before FIBERGLAS Insulation was adopted

A nationally known die-casting company was confronted with this problem: its metal-melting tanks required motors to drive pumps located directly above the tanks. These motors were installed 18 inches above the surface of the molten metal, in an ambient temperature of about 250° F.

Motors wound with organic insulation lasted, on the average, only about two weeks before the windings failed. As a solution, these motors were rewound with Fiberglas inorganic insulation—and six months later were still giving continuous service *without a single winding failure!*

This performance is typical of Fiberglas-insulated motors—but is only one of the advantages. When properly applied and impregnated with the correct varnish, Fiberglas insulation also gives exceptional performance in conditions of severe moisture, acid and vibration.

**What is Fiberglas?**

Fiberglas electrical insulation is made from strong, fine glass fibers which are twisted into yarns, wound on wires, woven into tapes and cloths, braided into sleevings and formed into cords and other forms required for motor insulation. As a rule, Fiberglas insulation occupies no more space inside the motor than organic tapes, and much less space than equivalent inorganic materials. And, because Fiberglas does not deteriorate with age, it is the ideal insulation for stand-by motors—even though an organic insulation seems sufficient from an operational point of view.

Ask your motor manufacturer about Fiberglas-insulated motors. Or, if you are having motor failures, ask your repair shop to use Fiberglas on your next rewind job.

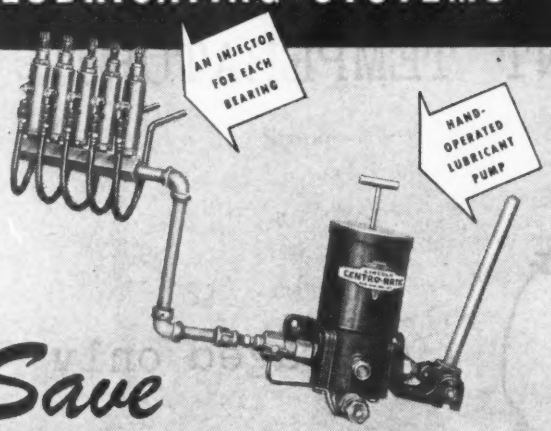
Fiberglas electrical insulations are immediately available. For complete information, consult your distributor or write *Owens-Corning Fiberglas Corporation, 1862 Nicholas Building, Toledo 1, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

**FIBERGLAS** *ELECTRICAL INSULATIONS*

*T. M. Reg. U. S. Pat. Off.

YARNS • TAPES • CORD • SLEEVING • CLOTH AND OTHER FORMS

# LINCOLN
## CENTRO-MATIC LUBRICATING SYSTEMS

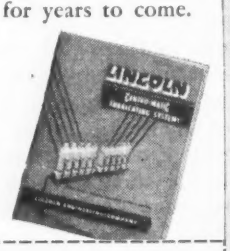



## Save
**MAN HOURS • BEARINGS**
**MACHINE HOURS • POWER**
***and reduce accidents . . .***

The Lincoln Centro-Matic System makes it possible to lubricate all bearings on one machine, or a series of machines from a central source without stopping the machines. This modern method saves man hours, machine hours, bearings and power, and reduces accidents.

The system is easy to install and consists of a number of Centro-Matic Injectors—one for each bearing—and a hand-operated, or a power-operated Centro-Matic Lubricant Pump. It will pay you to investigate this system if you want to increase your plant efficiency, not only today, but for years to come.

**Complete, illustrated bulletin on the Lincoln Centro-Matic Lubricating System will be sent to you without cost. The coupon below is for your convenience. Mail it today.**

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*On Lincoln Centro-Matic Lubricating Systems*

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*Title*_____
*Company*_____
*Address*_____
*City*_____ *State*_____

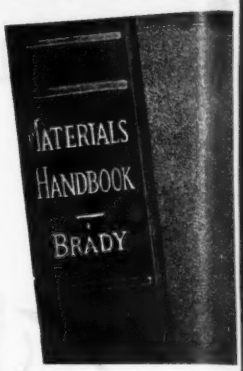
CA I 44-10

**LINCOLN ENGINEERING COMPANY**
*Pioneer Builders of Engineered Lubricating Equipment*
5701 NATURAL BRIDGE AVE., ST. LOUIS 20, MO., U. S. A.



# Practical data on 6,650 MATERIALS

*at your fingertips*




Save endless time through the use of this handbook for preliminary survey when you need materials. Easy to consult; gives the most helpful facts on kinds, properties, uses, sources, for thousands of natural and synthetic materials needed by purchasing agents, product engineers, factory executives, etc.

*Just Published*

# MATERIALS HANDBOOK

**BY**
**GEORGE S. BRADY**
765 pages, 5⅝ x 8¾
**$5.00**

*Enlarged Up-to-date 5th Edition*

*An encyclopedia for purchasing agents, engineers, executives, and foremen*

Now over 6000 material items are available to you, arranged and indexed for instant reference, and covered with regard to chief characteristics, comparative data, sources, substitutes, adulterants, and uses. Here's a short cut to accurate, essential facts needed in the selection and specification of materials. It points a clear way among new alloys, synthetic resins, industrial chemicals, many materials both new and old. It assembles the most pertinent and important facts to enable you to make quick comparisons, avoid checking many sources and remote possibilities, get quickly to the few materials best suited to a specific purpose.

**Find the material you need—*WHEN you need it—in such groups as***

Abrasives
Aircraft Metals
Bearing Metals
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Building Materials
Corrosion-resistant Alloys
Cupro-nickel Alloys
Fabrics, Leathers, Organic Materials
Fibers
Finishing Materials, Pigments, Solvents
Foundry Alloys and Materials
Heat-resistant Alloys
Heat-treating Materials
Industrial and Plating Chemicals
Iron and Iron Alloys
Light Metals and Alloys
Lubricants, Oils, and Greases
Metal Groups, Elements
Minerals
Military Chemicals and Commercial Explosives
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Ores of the Metals
Refractories and Heat Insulators
Steels and Tool Materials
Woods
White Metals
and others

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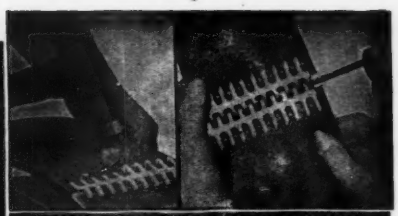
BELT LACING and FASTENERS for transmission and conveyor belts



"JUST A HAMMER TO APPLY IT"

# ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

## STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

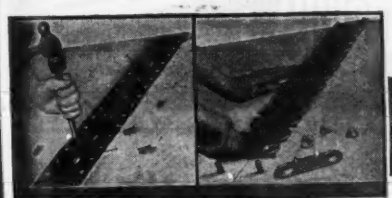
# FLEXCO HD

## BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

*Sold by supply houses everywhere*



"CONVEYOR BELTS EASILY FASTENED"

FLEXIBLE STEEL LACING CO.

4638 Lexington St.
Chicago, Ill.

# SUTTON SAND DRYING STOVES

The Standard for Over Forty Years

## Can Be Operated By Unskilled Labor

Today, when there's manpower shortage, it's important that your equipment is easy to operate—by anybody. That's an important feature of Sutton Sand Drying Stoves. Any worker about the plant can operate it to full capacity.

**SUTTON FEATURES**

- **Made in four sizes to meet all conditions**
- **Low original cost**
- **Economical upkeep**
- **Distributed by jobbers in all principal cities**

***Satisfaction Guaranteed***

***Catalog and Prices sent upon request***

# INDIANA FOUNDRY COMPANY

**950 Oak St., Indiana, Pa.**

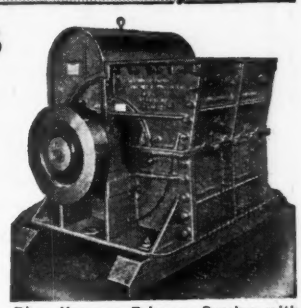
## GRUENDLER CRAFTSMANSHIP

*Serving Industry over 50 Years*

# Master Builders of Coal Reduction and Sizing Equipment

**For uniform coal sizes Lump, Egg, Nut, or Stoker**

Primary crushing of Bituminous mine run coal to 4" minus, capacity 5 Tons per hour, with the Gruendler Ring Hammer Crusher.



Ring Hammer Primary Crusher with patented tramp-metal catcher.

**WRITE FOR DATA**

Allow our Engineers to furnish you, without obligation, Blue Prints and Specifications on Crushing and Screening Equipment for—MINES — BY-PRODUCT COKE PLANTS AND BRIQUET MANUFACTURERS

Refer also to Coal Mining Catalog

# GRUENDLER

## CRUSHER and PULVERIZER CO.

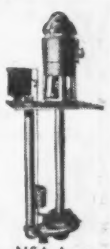
2915-17 North Market St., ST. LOUIS (6), MO.

## We Are Doing Our BEST for UNCLE SAM

ARMY-E-NAVY

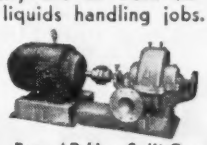
### We'll Do the Same for YOU

Our business is building pumps. Our ONLY policy is to build fine pumps. When you install pumps "by Aurora," you know that lasting efficiency and dependability are at work on your important liquids handling jobs.

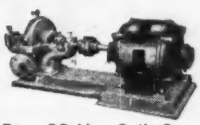


NSA Aurora Centrifugal Sump Pump

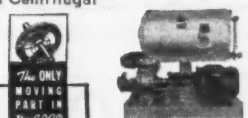
Aurora Deep Well Turbines for all conditions—4" to 24"



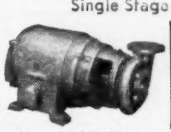
Type AD Hor. Split Case, Two Stage Centrifugal



Type OD Hor. Split-Case Double Suction Single Stage Centrifugal



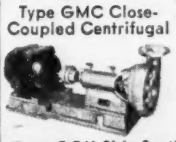
APCO Horizontal Condensation Return Unit



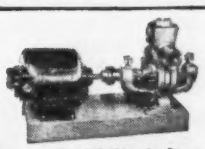
Type GMC Close-Coupled Centrifugal

**APCO TURBINE-TYPE PUMPS**—the simplest of all pumps. Ideal for small capacity, high head duties. Silent, compact and lasting.

The ONLY MOVING PART in the APCO



Type GGU Side Suction Single Stage Centrifugal



APCO Single Stage Turbine-Type

*Write for* **CONDENSED CATALOG OR**

SEE OUR CATALOG IN SWEET'S

***DISTRIBUTORS IN PRINCIPAL CITIES***

AURORA Always PUMPS

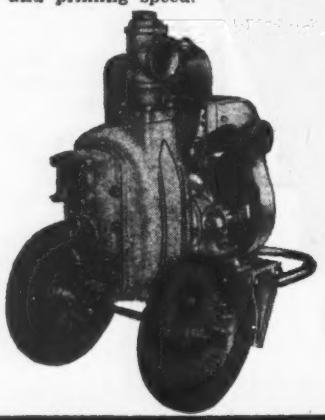
# AURORA PUMP COMPANY

92 Loucks Street, AURORA, ILLINOIS

# They Can Take It!

## DUAL PRIMERS

When it comes to DURABILITY, CMC Dual Primers have the "guts" to stand up to those tough, steady 24-hour grinds. DUAL PRIME MEANS unmatched performance and priming speed.



A husky 3" CMC Dual Prime. One of the complete line from 1½" to 10" sizes. Also 3" and 4" Diaphragms. Get catalog.

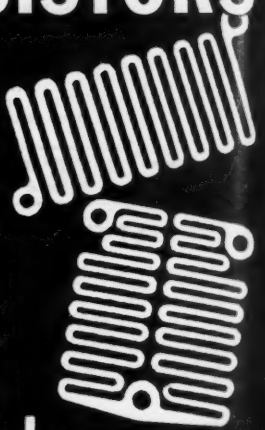
**CONSTRUCTION MACHINERY CO.**
**Waterloo · Iowa**

MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIPMENT
SAWS • CARTS • BARROWS

LONG LIFE? *Positively!*
ECONOMICAL? *Certainly!*
FIT YOUR EQUIPMENT? *Absolutely!*

## Alloy Cast Iron GRID RESISTORS

Consolidated grids have proven in years of service to be less susceptible to breakage—to be uniform in all dimensions. Boss faces ground automatically for 100% contact. We are prepared now to supply grid resistors for all principal makes of equipment



*Write for New Catalog!*

Largest Independent Makers of Grid Resistors Since 1920

**The Consolidated Iron-Steel Mfg. Co.**
1290 East 53rd Street — Cleveland 14, Ohio

PERFFORATED METAL
**COAL MINING SCREENS**

***Manufactured exactly to your specifications***
**Any size or style screen, in thickness of steel wanted with any size perforation desired.**
**We can promptly duplicate your present screens at lowest prices.**

**CHICAGO PERFFORATING CO.**
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

## MAN-power . . . . . "MP"

It takes Man-Power to make modern organization and equipment effective. The Man-Power of the industry served by COAL AGE is the experienced personnel included among the 12,000 subscribers of this paper. If your organization needs MAN-power, you can locate the best man, or men, available through a Position Vacant Advertisement in the SEARCHLIGHT SECTION of COAL AGE.

## WOOD PIPE for Mine Drainage

Wyckoff Wood Pipe has an 89 year record of perfect resistance to the corrosive action of sulphurous mine water. It is an ideal, long-time investment—light, easy to lay, and relatively low in first cost.

We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

Established 1855

Shipments from stock day after receipt of order. Send for catalog.

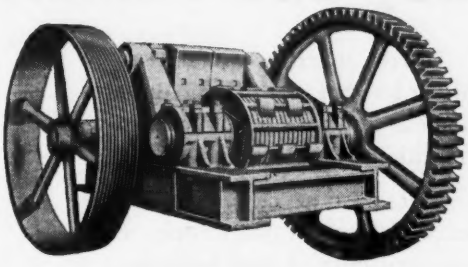
**A. WYCKOFF & SON CO.**
**Office and Factory**
**No. 35 Home Street, Elmira, N. Y.**
**The Originators of Machine Made Wood Pipe**

Emergency orders can be delivered by truck to mines in Pennsylvania coal fields following morning after receipt of same.

*IDEAL* FOR

**CRUSHING ROCK AND COAL**

**FOR FURTHER PROCESSING...**



McLanahan Rockmaster with Hopper removed.

**Where rock and coal are mixed together, the heavy duty all-steel McLanahan ROCKMASTER reduces the formation for further processing and resulting coal economies.**

**Coal is greatly needed for war production industries . . . investigate the coal savings you can realize with McLanahan all-steel ROCKMASTER CRUSHERS.**

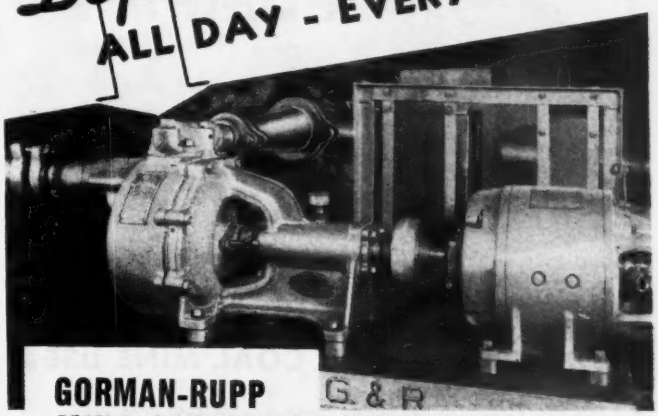
**McLanahan and Stone Corporation**

*Pit, Mine and Quarry Equipment Headquarters since 1835*

HOLLIDAYSBURG, PENNA.

*Dependable*

**ALL DAY - EVERY DAY**



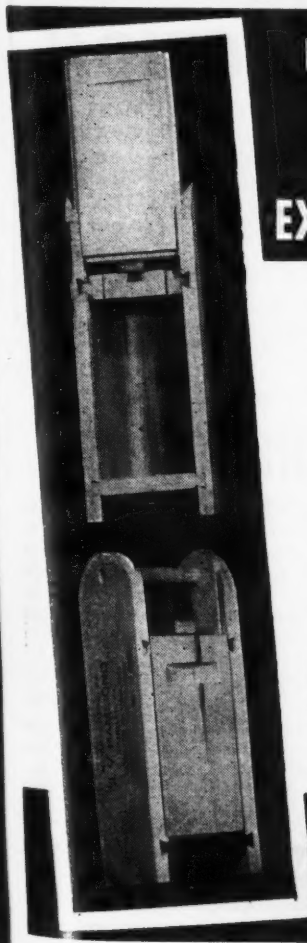
**GORMAN-RUPP**

**MINE GATHERING PUMPS** will run 24 hours a day—every day—without shut-downs. Here is why: The impeller is the only moving part and its wear is negligible. It operates at motor speed, thus eliminating all reduction gearing. Since Gorman-Rupp centrifugal pumps are self-priming, they don't even require priming equipment. There are no pistons, valves, cams—nothing to wear or make trouble. Capacities up to 220 GPM, at 125-foot head. Where pumps must operate reliably with infrequent attention, you can install Gorman-Rupp pumps with confidence. Designed for easy replacement of parts. Write for your copy of descriptive bulletin MP-2.

**THE GORMAN-RUPP CO., MANSFIELD, OHIO**

**GORMAN-RUPP**

**SELF-PRIMING CENTRIFUGAL PUMPS**



**HAMMOND'S**

*Latest Type*

**SAFETY EXPLOSIVE BOXES**

***Approved by Penna. Dept. of Mines***

Boxes are constructed entirely of wood, having no metal parts. They are of tongue-grooved and dovetailed construction, having handle for carrying, and are equipped with automatic lock using rubber bands for a spring.

NOTE: There are NO metal parts . . . conforming to regulations of the Penna. Dept. of Mines.

Important: Prompt deliveries of these Hammond products: safety explosive boxes — wood tamping poles — shovel handles — rope rollers — trolley poles.

Order today or write for further details.

**NET PRICES**

**Boxes Made in These Sizes:**

| | | | |
|---|---|---|---|
| No. 9 | Powder Box | 9 stick size | 1.12 |
| No. 12 | " " | 12 " " | 1.27 |
| No. 16 | " " | 16 " " | 1.43 |
| No. 20 | " " | 20 " " | 1.58 |
| No. 36 | " " | 36 " " | 2.94 |
| No. 72 | " " | 72 " " | 4.23 |
| No. 6 | Detonator Box | 2½x3x6 inside | 1.01 |
| No. 8 | " " | 2x2½x8 " | 1.01 |

**J. V. HAMMOND**

SPANGLER, PENNA.

**HENDRICK**

*Carbondale 1600*

*for*

**PERFORATED PLATE**

Round—Square—Diagonal—Slot

*Any perforation*

**HENDRICK MANUFACTURING CO.**

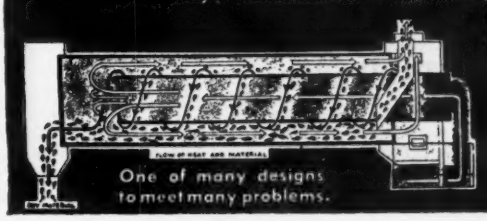
41 DUNDAFF ST., CARBONDALE, PA.

Sales Offices in Principal Cities
Please Consult Telephone Directory

Benefit by the many years of experience in designing and manufacturing of

**The L. R. CHRISTIE CO.**

17 E. 42nd Street
New York 17, N.Y.



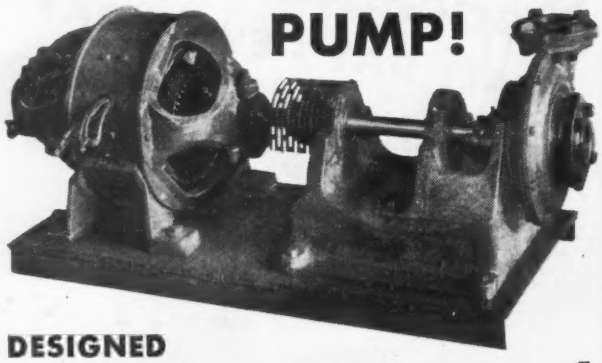
One of many designs to meet many problems.

**Dryers**

**Calciners**

**Coolers**

## *Here's a* NEW Centrifugal PUMP!



**DESIGNED**
***Specifically* FOR COAL MINE USE!**

This new Flood City Gathering Pump . . . for coal mine use . . . is made in 2" or 2½" discharge sizes with capacities of 75 to 225 gallons per minute, against heads up to 100 ft.

High efficiency operation results from an open type, non-clogging impeller operating in a volute case. The chrome steel shaft runs in two ball bearings, properly spaced on the shaft and sealed to prevent leakage of grease or entrance of dirt or water. Case is arranged for easy adjustment of discharge to any one of four positions. Is easily dismantled with ordinary wrench. Write at once for further details.

**FLOOD CITY BRASS & ELECTRIC COMPANY**
JOHNSTOWN, PA.



# Dustless Coal For Consumer Satisfaction Today *and Tomorrow*

Today, operators are pressed to fill orders for coal—long the economical and safe fuel. Tomorrow, conditions may be different.

Coal must be clean to compete successfully with other fuels. Protect the future of your business . . . dustproof and freezeproof your coal with Dowflake *today* so you will get your share of business *tomorrow.*

**THE DOW CHEMICAL COMPANY**
**MIDLAND MICHIGAN**

New York • Boston • Philadelphia • Washington
Cleveland • Detroit • Chicago • St. Louis
Houston • San Francisco • Los Angeles • Seattle

**DOWFLAKE CALCIUM CHLORIDE 77-80%**


## SEARCHLIGHT SECTION

**WANTED**
### MINING ENGINEER
To assist in layout and development of new properties and mechanization of existing mines. Position offers continuous post war employment to qualified party.
P-273, Coal Age
520 North Michigan Ave., Chicago 11, Ill.

### POSITION WANTED

SUPERINTENDENT, twenty years practical mining experience, technically trained, qualified to handle all phases of coal mine operations. Physically fit, age 47, head of family. Will not consider war time position. PW-267, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

### REPRESENTATIVE AVAILABLE

RELIABLE COAL organization of long standing on Eastern Seaboard seeks sole selling agency relationship with producer desiring a good job over next 20 years. RA-269, Coal Age, 330 W. 42nd St., New York 18, N. Y.

### BUSINESS OPPORTUNITY

COAL MINE Ohio. 245 acres under lease; average hundred ton day; can increase; modern equipped; good prices; near railroad; main highway; price $32,000. Apple Company Brokers, Cleveland, Ohio.

WANTED: A few going coal mines with good roof and large undeveloped acreage. Must have clean coal and some equipment and camp for employees. Give full details in first letter. Avory Scott Coal Co., Box 3, Kimball, W. Va.

**WANTED**
### COAL STRIPPERS
Contract to strip five million tons of high grade Penna. low volatile coal available. Very profitable long time contract.
**JULIETTE COAL CO.**
Grant Bldg. Pittsburgh, Pa.

## SEARCHLIGHT SECTION
*(Classified Advertising)*

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

*(Not available for equipment advertising)*
10 CENTS A WORD. MINIMUM CHARGE $2.00.
*Positions Wanted* (full or part time individual salaried employment only), ½ the above rates payable in advance.
*Box Numbers*—Care of publication New York, Chicago or San Francisco offices count as 10 words.
*Discount* of 10% if full payment is made in advance for 4 consecutive insertions.

*Individual Spaces* with border rules for prominent display of advertisements.

The advertising rate is $6.30 for inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

*An advertising inch* is measured ⅞" vertically on one column. 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by October 2nd will appear in the October issue, subject to limitations of space available. C.A.

**WANTED**
### LARGE COAL ACREAGE
Corporation will pay cash for going coal stripping operation with large coal acreage or will purchase coal acreage and strip with our equipment. (Prefer area with upwards 5 million tons). State seam and thickness, analysis, amount of coal, height and type of overburden, proximity to railroad and other pertinent data.
BO-254, Coal Age
330 West 42nd St., New York 18, N. Y.

**FOR SALE**
### LIGNITE COAL MINE
located at Garrison, No. Dak., sales 100,000 tons, consisting of the following property owned in fee: 545 acres of land, 7 ft. coal vein, 3 miles trackage, 40-car tipple, 2½ yd. dragline, 1½ yd. shovel, trucks, tractors, miscellaneous tools, shop and equipment.
**STEVENS BROS. COAL CO.,**
ST. PAUL MINNESOTA

### WE LOOK INTO THE EARTH
By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.
PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

**DIAMOND CORE DRILLING,** for any mineral. More than sixty gasoline, steam and electric drills, suitable for any job. **OUR SPECIALTY—testing bituminous coal lands.** Satisfactory cores guaranteed. Prices very reasonable.
**HOFFMAN BROS. DRILLING CO.**
PUNXSUTAWNEY, PA. Est. 1902 Tel. 382

**Equipment Wanted Advertising—Page 186**

# SEARCHLIGHT SECTION

### ROTARY CONVERTERS

500 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
500 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
500 KW WEST. SYN 275 V. 6 Ph. 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
300 KW G.E. SYN 575 V. HCC. 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

### MOTOR GENERATORS

200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM. Manual Switchgear.
200 KW R.W. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM. 80% P.F. Manual Switchgear.

### LOCOMOTIVES

13-T WESTGHE., 250 V., 908-C Mts., 36" Ga.
13-T GOODMAN, 250 V., 36-A Mts., 36"-42" Ga.
10-T WESTGHE., 250 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE., 500 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHE., 250 V., 906-C Mts., 36"-44" Ga.
8-T WESTGHE., 500 V., 906-C Mts., 36"-44" Ga.
8-T GEN. ELEC., 250 V., 839 Mts., 36"-48" Ga.
6-T WESTGHE., 250 V., 904-C Mts., 36"-48" Ga.
6-T GEN. ELEC., 250 V., 823-A Mts., 36"-44" Ga.

*Each unit listed above is owned by us and is available now for immediate purchase.*

**WALLACE E. KIRK COMPANY**
Incorporated
501 Grant Building Pittsburgh, Pa.

---

## SPOT CASH

**FOR COMPLETE MINES GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.**

Frank J. Wolfe

## FOR SALE

### LOCOMOTIVES—250 VOLT DC

3—15-ton Jeffrey
1—13-ton Goodman
3—10-ton Goodman
4—8-ton General Electric
5—6-ton General Electric
8—6-ton Goodman

### STEEL TIPPLES

Several 3, 4 and 5-track complete Steel Tipples.

### BARGAINS

10—5-BU Joy Loading Machines.
8—L-400 Jeffrey Loading Machines.
3—#3 Myers-Whaley Loading Machines.
5—29-C Arcwall Machines.
3—Sullivan CLU Track Cutters.
10—12-AA Goodman Shortwall Machines.
5—Sullivan CE-7 Shortwall Machines.
2—200 KW Westinghouse Motor Generator Sets.

*Electric Hoists from 300 to 1500 H.P.—Slope, Shaft or Drift*

***Mail us your inquiries!***

**COAL MINE EQUIPMENT SALES COMPANY**
306-7 Beasley Building L. D. Phone-34 Terre Haute, Indiana

---

## Slip Ring Motors

| Qu. | H.P. | Make | Type | Volts | RPM |
|---|---|---|---|---|---|
| 1 | 20 | A-C | | 440 | 1150 |
| 1 | 30/15 | G.E. | OMT | 440 | 1150/550 |
| 3 | 35/15 | G.E. | OMT | 440 | 1150/550 |
| 3 | 50 | G.E. | OMT | 440 | 1150 |
| 1 | 50 | Ideal | AV | 2200 | 575 |

## Squirrel Gage Induction Motors

| Qu. | H.P. | Make | Type | Volts | RPM |
|---|---|---|---|---|---|
| 1 | 15 | West. | CS | 220 | 1160 |
| 1 | 15 | West. | CS | 440 | 1155 |
| 1 | 20 | A-C | | 220 | 860 |
| 2 | 25 | A-C | AN | 440 | 1150 |
| 1 | 40 | A-C | | 2200 | 860 |

## Other Items In Stock

1—½ to 30 HP, D.C. Motors
1—I/R Portable Type Air Compressor
150—5 Ampere, 110 Volt, 2 Wire Meters
1—200 K.W. 600 Volt, G.E. Converter
3—165 KVA, G.E. Rotary Transformers

District Representatives For I-T-E Automatic Reclosing Circuit Breakers.

**R. H. Benney Equipment Company**
Norwood 12, Ohio

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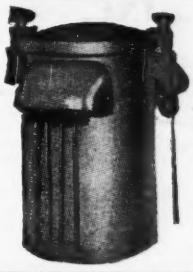
## —TRANSFORMERS—



**BOUGHT and SOLD**

We have several thousand transformers in stock for prompt shipment, and invite your inquiries.

**PIONEER TRANSFORMER REBUILDERS**

We rewind, repair and redesign all makes and sizes.

*One Year Guarantee*

**THE ELECTRIC SERVICE CO., INC.**
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M Since 1912 CINCINNATI 27, OHIO

---

24" x 48" Link Belt two roll coal crusher;
24" x 26" two roll coal crusher
50 Ft. crane boom and 1 yard clam bucket
15 H. P. Munday single drum hoist

**ACME EQUIPMENT COMPANY**
Allison Park, Pa.

---

## MINE EQUIPMENT

Transformers, 6600, 2200 & 440 Volt, 1 & 3 Phase
Hoist, 50 Hp Lidgerwood Double Drum, Tail Rope
Controllers, Both Locomotive and Auto Mine Hoist
350 HP 3/60/2200 V Weco 585 RPM S.R. Motor
250 HP 3/60/2200 V Weco 277 RPM S.R. Motor
200 HP 3/60/2200 V Geco 600 RPM S.R. Motor
A.C. & D.C. Motors—Large Stock
Switchboards Built to Order

**John D. Crawbuck Co. Zone 22 Pittsburgh, Pa.**

---

1—Vulcan keyed drum 30' dia. W. M. Coil 2500 ft. ¾ rope—Complete with 50 H.P. Motor
1—Lidgerwood Cone Friction 42" with Coil 2500 ft. ⅞ rope, 100 H.P. Motor
1—Vulcan Band Friction Two Drum 54" dia. 150 H.P. Motor
1—Vulcan Cylindro - Conical Shaft Hoist 350 ft. 1⅜ rope 400 H.P. Motor
1—Connellsville Cylindro-Conical Shaft Hoist 250 ft. 1½ rope 800 H.P. Motor

*And other hoists to suit all mining conditions*

**Jones Mining Equipment Co.**
541 Wood Street Pittsburgh, Pa.

---

## MINING EQUIPMENT READY FOR DELIVERY

### CUTTING MACHINES

1—12-AA Goodman Standard, 250 volt
1—28-A Jeffrey, 250 volt
1—28-A Jeffrey, 500 volt
1—CR-8 Sullivan, 250 volt
1—29-B Jeffrey Arcwall, 250 volt
1—29-B Jeffrey Arcwall, with 29-C bit motor, 250 volt

### LOCOMOTIVES

All 250 volt

10-Ton Jeffrey MH-110, 44" gage, inside frame
10-Ton Jeffrey MH-78, 42 or 44" gage, outside frame
8-Ton Westinghouse, 44" gage, inside frame
4-Ton Jeffrey MH-96, 48" gage, inside frame
4½-Ton Ironton low vein, 42 or 44" gage

### MISCELLANEOUS

300 Ampere Lincoln welding machine
16" Steptoe shaper
18 x 18" Jeffrey single roll crusher
25-HP. Single drum hoist
50-HP. Single drum hoist
2—A.C. Motors complete for low vein Goodman Mchs.
6—G.E. R-22-A Locomotive controllers
100-KW Westinghouse 250 volt compd. wound generator
100-HP Natural Gas engine with 220 volt A.C. generator

Transformers, Hoists, Tipple equipment, A.C. and D.C. motors and miscellaneous coal mining and industrial equipment.

LET US KNOW YOUR NEEDS—WE BUY, SELL, AND TRADE

**ALL-STATE EQUIPMENT CO.**
LOGAN, W. VA.

## PROMPT SHIPMENT FROM OUR WAREHOUSE

### MINING MACHINES

5—12 DA 50 HP 250 v. Goodman Shortwall
36 B Jeffrey 250 v. Low Vein #14318
35 B Jeffrey 250 v. 6' cutter
2—29 C Jeffrey 250 v. Top Cutters
112 Da Goodman 250 v. 50 HP Universal
3—Low Vein Sullivan CR-2 (250 v.)

### STORAGE BATTERY LOCOMOTIVES

2—6 Ton G.E. Permissible Locomotives 36/44" Ga. O.S. armorplate frame. Inside steel tired wheels. 2-HM 825 Ball Bearing Motors. Type LSBE Class 2C6 From C9. 13½' long, 50" high, 69" wide and 44" Wheel base.

Each of the above units equipped with Edison Battery 80 cell A-10—one new in 1940, the other in 1939.

2—5 to 5½ Ton Type D Ironton, 36 or 42" Ga. Low Type, with Exide Battery.
1—4 Ton Jeffrey 42 or 44" Ga. with 2 MH 108 Ball Bearing Motors, Battery Box on top of locomotive.
1—5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing Motors, Battery box on top of locomotive.
4 Ton 36" Ga. Atlas, with Exide Battery.
4 Ton 36" G.E. (2 motors), with Exide Battery.

### (Haulage)

13 Ton Westgh. 250 V. 36" or 40" Ga.
1—5 Ton West. 250 V. 36 or 42" Ga. with Electric Gathering Reels. Bar steel frame.
6 Ton Baldwin West. 250 v. 36/42" Ga. #48747 904 Motors outside bar steel frame, inside steel tired wheels.

### SCREENS

2—4' x 5' single deck Tyler Hummer Screens Type 37 equipped with V-16 Vibrators No. 2860 and 2867 designed for 110 v. AC 15 cy.

### MG SETS 3 ph. 60 cy. (Syn.)

150 KW G.E. 250 v. —2200/3/60 900 RPM.
100 KW Ridgway 250 V. DC—2200 V. AC 1200 RPM.
100 KW Chandeysson 150 v. DC—2300/3/60 AC Syn.

### COAL CRUSHERS

18" x 24" Double roll New.
18" x 30" Double roll New.

### ENGINE GENERATOR SETS

100 KW 250 V. DC Westgh.—Skinner Engine.
50 KW West. 125 V. DC—Skinner Engine.

### SLIP RING & SQ. CG. MOTORS (3 ph. 60 cy.)

| HP | Make | Speed | Wdg. | Type |
|---|---|---|---|---|
| 500 | G.E. | 450 | S.R. | MT 412 |
| 200 | G.E. | 250 | S.R. | MT 412 |
| 200 | G.E. | 600 | S.R. | I-M |
| 150/75 | West. | 580/290 | S.R. | CW |
| 150 | West. | 375 | S.R. | CW |
| 125 | Al. Ch. | 435 | S.R. | |
| 100 | G.E. | 500 | S.R. | MI-25 cy. |
| 100 | Al. Ch. | 575 | S.R. | |
| 100 | G.E. | 1200 | S.C. | |
| 100 | West. | 490 | S.R. | CW |
| 75 | West. | 290 | S.R. | CW |

### SYNCHRONOUS MOTORS

| HP | Make | Voltage | Speed | Type |
|---|---|---|---|---|
| 200 | West. | 2200 | 900 | |
| 150 | G.E. | 2200 | 900 | ATI |

Each of the above has a dir. con. exciter.

### DC GENERATORS

150 KW West. Type S, 250 v. 450 RPM
100 KW G.E. 250 v. 600 RPM
75 KW G.E. DLC 125 v. 700 RPM
65 KW G.E. CL 250 v. 1000 RPM
50 KW West. 250 v. 900 RPM
40 KW G.E. 250 v. 900 RPM

### PUMPS

250 GPM 250# or 575' Head 2 cyl. Hor. National Transit 6" suc. 4" dis. enclosed driven by 40 HP Motor.
250 GPM 275' Head Worthington, 4" suc. 3" dis. driven by 30 HP 230 v. DC Motor.

### HOISTS

500 HP Connellsville Sgl. drum slope Hoist complete with AC Motor and contactor control.
800 HP Vulcan Slope Hoist with AC Motor and Control
100 HP Vulcan Hoist drum 42" dia. 36" face, 9" flanges driven by 100 HP G.E. slip ring motor.
75 HP Lidgerwood sgl. fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
30 HP Double drum—Tandem
15 HP Lidgerwood sgl. dr. AC Motor

### 400 TRANSFORMERS [Westgh. & GE 1 ph.]

| Qu. | KVA | Pri. V. | Sec. V. |
|---|---|---|---|
| 40 | 5 | 1280/2200 | 115/230 |
| 31 | 7½ | " | " |
| 28 | 10 | " | " |
| 2 | 25 | 2200 | 244/488 |
| 3 | 50 | 2300 | 2200 |

**MOORHEAD-REITMEYER CO., INC.**
PITTSBURGH, PENNSYLVANIA

## ELECTRIC LOCOMOTIVES

1—10 ton G.E. steel frame, 250 V.H.M. 830-A Motors.
1—8 ton Goodman steel frame, 250 V. type 3104-T. 42" gauge.
2—6 ton Jeffrey, with MH-88 250 V. motors and reef.
1—6 ton West. bar steel frame with 904-C 250 V. Motors.
1—5 ton G.E. ready to operate, 42" gauge.
2—5 ton Goodman 250 V. 36" gauge.

## COAL CUTTING MACHINES

1—35 B Jeffrey 250 V.
1—35 Jeffrey A.C.
1—29 L.E. Jeffrey, 250 V.D.C.
2—124 EJ Goodman, 50 HP, 250 V. permissible track mounted slabbing machine.
1—12DA Goodman, 50 HP, 250 V.D.C.
1—12 G3 Goodman shortwall, 3/60/220 V.
1—12AB Goodman shortwall, 250 V. D.C.
1—36B Jeffrey 250 V. longwall.
1—90 L Goodman Elevating Conveyor.

## MOTORS AND GENERATORS

1—100 KW West, compound wound D.C. generator, 250 V.
1—100 KW Rotary Converter, 275 V. D.C. with 2300-4000 V. transformers.
1—600 HP Allis-Chalmers Cyn. 3/60/2200 V. Motor
1—165 HP G.E. Syn. 2200 V. 900 RPM Motor
1—15 HP G.E. ball bearing 3/60/220 Motor

*We have a complete line of D.C. motors.*
*Send us a list of any equipment you may have for sale.*

**TIPPINS MACHINERY COMPANY**
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TRACK ACCESSORIES from 5 Warehouses

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All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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AC & DC

REBUILT & GUARANTEED FOR IMMEDIATE SHIPMENT

New Electric Coal Drills for AC and DC
Mine Fans, Tipple Scales, etc.
2—Ironton 5-ton Storage Battery Locomotives.

*Equipment of all kinds*
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TRACK MATERIALS
RAILWAY EQUIPMENT
QUALITY—SERVICE—PRICE

**E. C. SHERWOOD** 50 Church St. New York

Davenport, Porter, Vulcan 18 to 20 ton steam 36" gauge S/T locomotives, (4), rebuilt
Plymouth and Milwaukee gas locomotives, (4), 8, 12, 25, 35 ton; 36" and std. ga., A-1.
American 85-ton steam locomotives, 0-6-0, (3).
Vulcan 18-ton steam S/T locomotive, 42" gauge.
Bucyrus 50B and 80B steam shovels.
Page Diesel 2-yd. Walker dragline, 65' boom.
Euclid 6-yd. bottom dump crawler wagons (8).

**H. Y. SMITH CO.**
828 N. Broadway Milwaukee 2, Wis.

2—Goodman Shaker Conveyor Drives, Type EA-10-70.
2—Goodman Shaker Conveyor Drives, Type EA-10-76.
2—Goodman Shortwall Mining Machines, Type 12-DA, with 7½ ft. cutter bar.
*Further details, and cost, may be obtained by writing to the*
**FLORENCE COAL COMPANY**
St. Clairsville Ohio

## FOR SALE

1—Goodman Shaker Conveyor, Model G-20
1—Sullivan Conveyor, Short Wall, Model 10-B
*Both machines operate on direct current.*

**SURMI MINES, INC.**
Box 1605 Great Falls, Montana

ELECTRIC EQUIPMENT CO.
63 CURLEW ST. • P.O. BOX 51
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## A DEPENDABLE SOURCE for HEAVY EQUIPMENT

CARS — CRANES — COMPRESSORS
DRAGLINES — LOCOMOTIVES
SHOVELS—TRACTORS—ETC.

WE WELCOME YOUR INQUIRIES

WE WILL FIGURE WITH YOU ON YOUR SURPLUS

**B. M. WEISS CO.**
Girard Trust Bldg. Phila, Pa.

## LOCOMOTIVES

1—6-Ton Gas Locomotive, 36" Ga., Milwaukee Locomotive Works
1—9-Ton Gas, 36" Ga., Whitcomb
1—8-Ton 0-4-0 Vulcan, S/G Ex. Cond.
2—25-Ton 0-4-0 Porter Saddle Tank Locos. Oil Burners: A.S.M.E. Code. Excel. Cond.
1—50-Ton 0-6-0 Vulcan Locomotive
1—60-Ton Westinghouse Electric, 550 V. D.C.
1—65-Ton 2-6-0 Mogul Loco. Oil-burning
1—70-Ton 0-6-0 Baldwin Switching ICC cond.
2—70-Ton Baldwin-Westinghouse Electric Locos., 600 volt D.C.
1—70-Ton Gas-Electric Locomotive
Other Locomotives, Too
1—70-Ton G.E. Battery Electric, Excel. cond.
1—80-Ton 0-6-0 Lima Switching, Excel. cond.

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## 6 YD. or 8 YD. STRIPPER SHOVEL

**225 Bucyrus 80 ft. Boom, 54 ft. Dipper Stick, Steam Shovel.**

## 3 WALKER DRAGLINES

**4 Yd. Monighan 90' Boom Diesel.**
**2W Monighan 60' Boom Diesel.**
**2 Yd. Monighan 60' Boom Elec.**

**16 YD. DRAGLINE:**
1—16 Yd. Electric Caterpillar Modern Dragline with 160' Boom

**AIR COMPRESSORS:**
(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12") Belted. 360, 676, 870, 10000, 1300 ft.
(12) Diesel 105, 315, 520, 676, & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2000, 5000 ft.
(14) Gasoline, 10, 160, 220, 310 & 370 ft.

**RUBBER CONVEYOR BELTS:**
1000' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14"

**TANKS:**
12,000 and 15,000 gal. and 20,000 gal.

**CONVEYOR PARTS:**
Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 16 In. Large stock here.

**STORAGE BATTERY LOCOMOTIVES:**
2½ ton Witcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

**TRACK SCALE:**
150 Ton Buffalo 56 ft. R.R. Track Scale

**TROLLEY LOCOMOTIVES:**
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

**VIBRATING SCREENS:**
9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

**CARS:**
60—Western 16-20-30 yd. Side Dump

**SHOVELS, CRANES & DRAGLINES:**
1 yd. K 30 Link Belt 50' Boom Crane
2 yd. Page 70' Boom Diesel Dragline
1¼ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane

**MINE LOADERS:**
Junior Joy 36 ga. Low Pan
3—5 BU & 7 BU & 12 BU 36 or 42 ga. Joy
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

**MISCELLANEOUS:**
5'x60' Traylor Rotary Dryer
Clamshell Buckets ¾; 1, 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan St. Ga Gas. Loco.

**WANTED TO BUY:**
Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers, Mine Loaders

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13484 S. Brainard Ave.
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**IRON and STEEL PIPE**
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**STEEL TANKS—STEEL BUILDINGS**
All sizes and kinds
Guaranteed used steel pipe
Valves and fittings
All items at various points
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## CONVEYOR BELTING

**ABRASIVE RESISTANT COVERS**

| Width | Ply | Top-Bottom | Covers | Width | Ply | Top-Bottom | Covers |
|---|---|---|---|---|---|---|---|
| 48" | 8 | 1/8" | 1/16" | 20" | 5 | 1/8" | 1/32" |
| 42" | 5 | 1/8" | 1/16" | 20" | 4 | 1/8" | 1/32" |
| 36" | 6 | 1/8" | 1/16" | 18" | 4 | 1/8" | 1/32" |
| 30" | 6 | 1/8" | 1/16" | 16" | 4 | 1/8" | 1/32" |
| 30" | 5 | 1/8" | 1/16" | 14" | 4 | 1/16" | 1/32" |
| 24" | 5 | 1/8" | 1/32" | 12" | 4 | 1/16" | 1/32" |
| 24" | 4 | 1/8" | 1/32" | | | | |

*Inquire For Prices - Mention Size and Lengths*

## TRANSMISSION BELTING

**HEAVY-DUTY FRICTION SURFACE**

| Width | Ply | Width | Ply | Width | Ply |
|---|---|---|---|---|---|
| 18" | 6 | 10" | 6 | 6" | 5 |
| 16" | 6 | 10" | 5 | 5" | 5 |
| 14" | 6 | 8" | 6 | 4" | 5 |
| 12" | 6 | 8" | 5 | 4" | 4 |
| 12" | 5 | 6" | 6 | 3" | 4 |

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## ENDLESS "V" BELTS

| | |
|---|---|
| "A" WIDTH All Sizes | "D" WIDTH All Sizes |
| "B" WIDTH All Sizes | "E" WIDTH All Sizes |
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## FIRE HOSE

**APPROVED SPECIFICATION HOSE**
**EACH LENGTH WITH COUPLINGS ATTACHED**

| Size | Length | Per Length |
|---|---|---|
| 2½" | 50 feet | $28.00 |
| | 25 " | 16.00 |
| 2" | 50 " | 23.00 |
| | 25 " | 13.00 |
| 1½" | 50 " | 20.00 |
| | 25 " | 11.00 |

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
## RUBBER HOSE

**WATER HOSE**
Each Length with Couplings Attached

| I.D. Size | Length | per Length |
|---|---|---|
| ¾" | 25 feet | $4.25 |
| 1" | 50 " | 8.00 |
| | 25 " | 6.25 |
| 1¼" | 50 " | 12.00 |
| | 25 " | 7.50 |
| | 35 " | 10.50 |
| | 40 " | 12.00 |
| 1½" | 50 " | 15.00 |
| | 25 " | 10.00 |
| | 35 " | 14.00 |
| | 50 " | 20.00 |

**AIR HOSE**

| I.D. Size | Length | per Length | Couplings |
|---|---|---|---|
| ½" | 25 feet | $5.00 | $1.50 Pair |
| | 50 " | 10.00 | 1.50 " |
| ¾" | 25 " | 6.25 | 2.50 " |
| | 50 " | 12.50 | 2.50 " |
| 1" | 25 " | 10.00 | 3.50 " |
| | 50 " | 20.00 | 3.50 " |

**LARGER SIZES ALSO AVAILABLE**
*All Prices—Net—F.O.B. New York*

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**PIPE—MACHINERY—GAS ENGINES**
**AIR COMPRESSORS—DIESELS—PUMPS**

Some Steam Engines and Boilers available only slightly above the metal price

**BRADFORD SUPPLY COMPANY**
WAYNE, WOOD COUNTY, OHIO Near Toledo

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**PIPE** New & Reconditioned
**ALL SIZES for ALL PURPOSES**
Cut and Threaded to Your Specifications
**VALVES AND FITTINGS**
**UNITED PIPE & SUPPLY CO., NORRISTOWN, PA.**

# SEARCHLIGHT SECTION

## LOCOMOTIVES

**Goodman:** All 250 volts.
1—10 ton, 31-1-4-T.
1— 6 ton, 30B, 43" 1—5 ton.
1— 5 ton, W-1-2, 36".
2— 5 ton, 2600 K.
1— 6 ton, 33-1-4-T.
2— 8 ton, 32-1-4-T.

**Westinghouse:** All 250 volt.
1—4 ton, 902, 48" 1—13 ton, 102, 42"
1—904 c, 44" 500 volt. Also 906 motors.
1—10 ton, 915.
Bar steel frames 10 ton, 6 ton, and 4 ton.

**G.E.:** All 250 volt. 4 ton 1022, 44" as is
6 ton 803, 44", as is 5 ton 825, 44"
6 ton 823, 44" 8 ton 839 motors
6 ton 801
8 ton 839

**Jeffrey:** 6 ton, and 4 ton, all gauges, 250 volt
1—**Jeffrey** MH 100, frame only.

## MINING MACHINES

**Jeffrey**, 35B and 4—28A, 250 V. 4—29B 29C with shearing head.

**Goodman**, 12A, 12AB, 12AA, 12G3A, 34B
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA, 3—124AA.

**Sullivan**, CE7, CE9, CE10, CR10 Low Vein. CR5 for middle cutting.

## SUBSTATIONS—275 volts, D. C.

2—200 KW **G.E.** Rotaries (600 volt)
2—150 KW **West.** Rotary.
1—200 KW 1—100 KW **Ridgway** M-G Sets
1—100 KW **West.** M-G Sets.
2—100 KW **G.E.** Rotary.

## SPARE ARMATURES

**Jeffrey** MH 110, MH 78, MH 73, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB, 12AA 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V. Bracket Type, 150 KW G.E. HCC Bracket Type, and 150 KW G. E. TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 24"x24" * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead. AC. 3-60-440. 1 ton and 2 ton * 1 Clam shell bucket 1¾ cubic yard. 1—Figure 8 drum * MINE CARS * 2 SULLIVAN BIT SHARPENERS * R.R. SWITCHES 85# to 100# HOISTS 5 HP AC and DC GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 volt direct connected to steam engine. Goodman Scraper Loader.

## GUYAN MACHINERY COMPANY, Logan, W. Va.

## FOR SALE BY OWNER

2—300 H.P. Keeler Water Tube Boilers. Complete with stokers, generators, engines and pumps. 1—3 track steel shaft tipple complete.

**BELL VALLEY MINING CO.**
Bell Valley Ohio

American Ring Crusher, size 24FF 30 HP. 600 rpm. totally enclosed, motor, 60 cycle.
*Immediate delivery.*
PHONE COLLECT for price
**ELECTRIC EQUIPMENT COMPANY**
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GLENWOOD 6783

*NEW and REBUILT*
STORAGE BATTERY
## LOCOMOTIVES
1½ to 10 Ton—13" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

## FOR SALE
## USED MINING EQUIPMENT

1—Oldroyd Universal Cutting Machine 250 volts, D.C. Permissable, 9' Cut, 44" gauge—recently rebuilt and in good operating condition.

1—Link-Belt Vibrating Screen, Double Deck 5' x 10', 1⅛" Screen on top deck, ⅜" screen on bottom deck. Powered by 440 volt Westinghouse 7½ H.P. Motor and V-Belt Drive.

50—2 ton mine cars 42" gauge 43" above rail. Rotary or end dump.

**Greensburg-Connellsville Coal & Coke Co.**
Union Trust Building Pittsburgh, Pa.

## FOR SALE

Lima 2½ yard Diesel Dragline, 85' boom
Marion 371, 1¾ yard Shovel-Crane-Dragline
P & H 650 Shovel and Crane
Buc. Erie GA-2 Shovel, gas
General ½ yd. Diesel Crane
P & H 250 Truck Crane, 16½ tons
P & H 203A Truck Crane, 8 tons
Universal 7½ ton Crane on Mack Truck, rebuilt
Lorain 45 Crane-Shovel, ¾ yd.
Lorain 75-B, 1½ yd. Shovel-Crane
Northwest Model 3 Shovel-Backhoe
Conway Mucker "75", 36" gauge
2—Conway Muckers "50", 36" ga. rebuilt
Buc. Erie 50B Steam Shovel 2 yds.
Marion Model 37 Steam Shovel, 1¾ yds.
Koehring 301, ¾ yd. Shovel & Crane
Buc. Erie Steam Dragline, 6-8 yds. 175' bm.
Speeder ½ yd. Backhoe
Ind. Brownhoist Crane, gas, 40' boom, 1 yd.
Allis Chalmers HD10 Tractor with bulldozer
Allis Chalmers LO Tractor with bulldozer
Allis Chalmers "L" Tractor with bulldozer
Allis Chalmers "K" Tractor with bulldozer
Int. T35 Tractor with Angledozer
Int. T35 Tractor with Angledozer
Allis Chalmers "30" Tractor with bulldozer
Jaw Crushers: 12x26, 13x30, 14x28, 16x32
Gyratory Crusher, Superior-McCully 30"
Gyratory Crusher, Traylor Type T, 12"
Mundy 35 H.P. double drum gas Hoist
National 100 H.P. dbl. drum Dragline Hoist, elec.
Baldwin 78 ton Side Tank Locomotive
American 75 ton Locomotive, steam. Rebuilt
American 45 ton Saddle Tank Switcher
Vulcan 30 ton Steam, std. gauge Saddle Tank loco.
Vulcan 25 ton Steam Loco. std. ga., side tank
Whitcomb 14 ton, 36" gauge Diesel Loco.
Davenport 10 ton, std. gauge, gas Loco.
Vulcan 6 ton, 36" gauge, gas Locomotive
15—Gondola Cars, 50 tons, steel
Pumps—Gas, Electric, Steam, large stock
I. R. 1302 CFM., 2 stage Air Compressor
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Erie ¾ yd. Clam, rehandling Bucket
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1—250 KW Westinghouse Synchronous Generator, 600 Volt DC, direct connected to: 365 HP Westinghouse Motor, 3/60/2200, 1200 RPM.

1—165 KW General Electric Generator, 600 Volt DC, direct connected to: 300 HP General Electric Motor, 3/60/440, 720 RPM.

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7' Cincinnati Bickford Radial M.D.

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received by October 2nd, will appear in the October issue, subject to limitations of space available.

*Address copy to the Departmental Staff*
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1—400 Amp. 275 volt, type ARL, serial No. 7530.
1—600 Amp. Class I, type AHD, 275 v. Ser. No. 8051.

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1—CE-7 Sullivan 36" ga. 1—Sullivan 5B Buddy.
2—Armatures for CE-7 Sullivan 250 v. D.C.

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1—3½ ton Ironton Battery 36" ga.
5—5 ton Goodman 30 B, 250 v. 36" ga.
4—5 ton Goodman 2600R Gathering Locomotives, 250 v. DC 42 or 44" ga. with cable reels.
2—7 ton Goodman 32-0-4-T 250 v. 36" ga.
1—10 ton Milwaukee Gasoline.
1—10 ton West. 500 v. 40" ga.
1—10 ton Goodman Locomotive, 250 v. 42" ga. cast iron frame, inside wheels.
1—13 ton Westinghouse 42" ga. 250 v. Locomotive, cast iron frame, two motor type, single end control.

**DIESEL ENGINE GENERATOR SET**

1—75 KW, 250 v. DC, type SK Westg. Gen. belted to 100 HP Buckeye Horiz. Diesel.

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2—1000 GPM Cameron bronze, 100' hd.
1—800 GPM Weinman 90' hd. 6 x 5.
1—1000/1200 GPM Weinman Cent. single stage Pump, 6" suc. 5" dis. 150 ft. hd. 75 HP 1750 rpm. Motor.

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150 KW Ridgeway 250 v. DC, 900 rpm., 2200/3/60, syn.
1—200 kw. West. 250 v. DC 1200 rpm. 2200 v. 3 ph. 60 cy. complete with AC and DC switchboard, also automatic reclosing circuit breaker.
1—300 KW West. 550 v. DC 1200 rpm. 2200 v. 3/60 complete with AC and DC swb; also automatic reclosing circuit breaker.

**ROTARY CONVERTERS**

3—150 kw. West. 3 ph. 60 cy. 275 v. 1200 rpm. Rotary Converters complete with transformers and switchboard.
3—300 kw. West. 3 ph. 60 cy. 600 v. 1200 rpm. Rotary Converters complete with transformers and switchboard.

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| No | Kva | Pri | Sec | Make |
|---|---|---|---|---|
| 1 | 100 | 2200 | 110/220 | G.E. |
| 3 | 100 | 6600 | 550/440/220 | Pgh. |
| 3 | 50 | 11430/6600 | 550 | Al. Ch. |
| 3 | 50 | 6600 | 575 | G.E. |
| 3 | 50 | Westg. | 4000/2200 | 230/460 |
| 1 | 37½ | 2300 | 220/440 | Wagner |
| 3 | 37 | 4400 | 185 | West. (Rotary) |
| 35 | 10 | 2200 | 110/220 | G.E. |
| 100 | 7½ | 2200 | 110/220 | G.E. |
| 75 | 5 | 2200 | 110/220 | West. |

**SLIPRING MOTORS—3 ph. 60 cy.**

| HP | Make | Type | Volts | RPM |
|---|---|---|---|---|
| 300 | G.E. | I | 440 | 900 |
| 260 | Burke | EMV-65 | 440 | 600 |
| 150 | G.E. | I-8 | 220 | 375 |
| 150 | West. | CW | 220/440 | 490 |
| 150/75 | West. | CW | 220/440/2200 | 580/290 |
| 100 | West. | CW | 220 | 490 |
| 100 | G.E. | I | 220 | 450 |
| 75 | West. | CW | 220/440/2200 | 580/290 |
| 50 | Chand. | | 220/440 | 1800 |
| 50 | G.E. | HI | 220/440 | 1200 |
| 50 | Allis Chal. | | 220 | 490 |
| 50 | West. | CW-636A | 440 | 1150 |
| 50 | G.E. | OM-7 | 220/440 | 1160/560 |
| 40 to 50 | Westg. | CW | 440 | 1150 |
| 20 | Westg. | CW | 220 | 1735 |

**230 V. DC MOTORS**

| HP | Make | RPM | Type |
|---|---|---|---|
| ¾ | Cr. Wh. | 850 | EL |
| 1 | Louis Allis | 1150 | INA |
| 1½ | Westg. | 2200 | SK |
| 1½ | Westg. | 1000 | CD |
| 1½ | West. | 900 | SK |
| 1½ | Robbins-Myers | 1750 | |
| 2 | Thompson | 1100 | |
| 3 | Robbins-Myers | 1750 | S |
| 3 | Westg. | 850 | SK |
| 4 | Westg. | 1180 | |
| 5 | Robbins-Myers | 1750 | |
| 5 | Robbins-Myers | 875 | |
| 5 | Imperial | 540 | SK |
| 5 | Westg. | 850 | |
| 5 | Westg. | 1600 | RC |
| 5 | Lincoln | 1300 | |
| 7½ | Cr. Wh. | 875 | |
| 10 | Robbins-Myers | 1750 | S |
| 10 | Allis Chal. | 1200 | |
| 15 | G.E. | 850 | RC |
| 20 | G.E. | 925 | CQ-15 |
| 30 | Westg. | 1025 | S-7 |
| 35 | G.E. | 900 | DLC |
| 40 | Westg. | 950 | SK-130 |

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14, Ballast, Composite, 50-Ton
25, Box, 36-Ft., 40-Ton
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18, Dump, K & J Automatic, 16-Yd. 40-Ton
20, Flat, 40-Ft., 40 and 50 Ton
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For details address **FS-274**, Coal Age
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2 Vulcan bottom Discharge Skips, having a capacity of 260 cubic feet, with a hopper 5'10½ x 7'0" inside skips to be complete with safety chains, safety dogs or catches, rope cone, and rope clamp for 1⅝" rope.
1 Platform cage, 6'0½" between guides, 10'8" long, to be complete with car locking device.
2 Sets curved dump guides on tracks.
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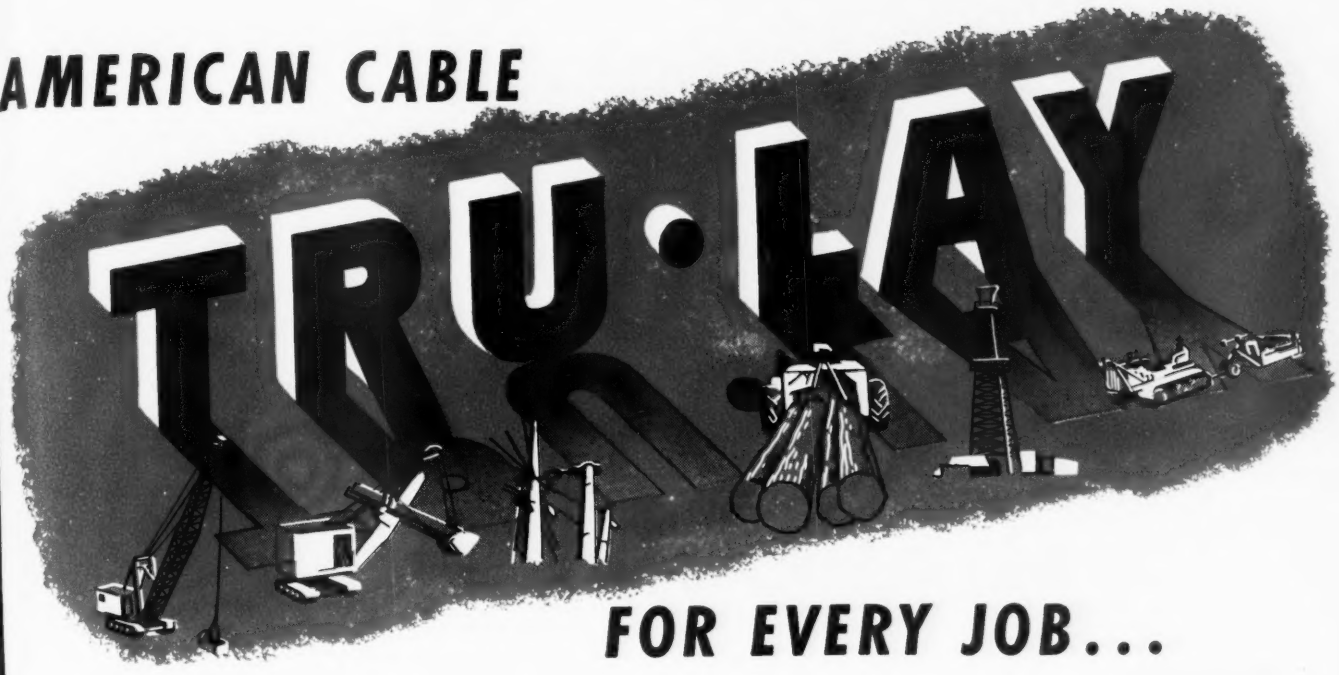


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